

AD-770 987

AN IMPLICIT METHOD FOR THREE-DIMENSIONAL
VISCOUS FLOW WITH APPLICATION TO CONES
AT ANGLE OF ATTACK

William S. Helliwell, et al

Aerospace Corporation

Prepared for:

Space and Missile Systems Organization

10 September 1973


DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

UNCLASSIFIED
Security Classification

AD 770 987

DOCUMENT CONTROL DATA - R&D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) The Aerospace Corporation El Segundo, California		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE An Implicit Method for Three-Dimensional Viscous Flow with Application to Cones at Angle of Attack		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (Last name, first name, initial) William S. Helliwell Stephen C. Lubard		
6. REPORT DATE 73 SEPT 10	7a. TOTAL NO. OF PAGES 178	7b. NO. OF REFS 16
8a. CONTRACT OR GRANT NO. F04701-73-C-0074	9a. ORIGINATOR'S REPORT NUMBER(S) TR-0074(4450-64)-1	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	SAMSO-TR- 73-363	
10. AVAILABILITY/LIMITATION NOTICES Approved for public release; distribution unlimited		
11. SUPPLEMENTARY NOTES Reproduced from  best available copy.		12. SPONSORING MILITARY ACTIVITY Space & Missile Systems Organization Air Force Systems Command Los Angeles, California
13. ABSTRACT An iteration method for solving the implicit difference equations associated with three-dimensional nonlinear parabolic differential equations is derived and analyzed. The method is applied to the high Reynolds number laminar viscous flow around a cone at high angle of attack. The requirements which must be met to ensure convergence of the iterations are obtained. In addition, an analysis of the stability of the difference equations is presented and discussed. The numerical results are compared with experimental data for a 10-deg cone at 12-deg angle of attack, and a 5.6-deg cone at 8-deg angle of attack. The agreement is very good. A description of the associated computer program is contained in the appendices. ia		

KEY WORDS

iteration
implicit differencing
3-D parabolic differential equations
viscous flow
cone at angle of attack
convergence analysis
stability analysis
departure solution
separation

Abstract (Continued)

16

Air Force Report No.
SAMSO-TR-73-363

Aerospace Report No.
TR-0074(4450-64)-1

AN IMPLICIT METHOD FOR THREE-DIMENSIONAL
VISCOUS FLOW WITH APPLICATION TO
CONES AT ANGLE OF ATTACK

Prepared by

William S. Helliwell
Information Processing Division

and

Stephen C. Lubard*
Vehicle Engineering Division
Engineering Science Operations

73 SEP 10

Reentry Systems Division
THE AEROSPACE CORPORATION
El Segundo, California

Prepared for

SPACE AND MISSILE SYSTEMS ORGANIZATION
AIR FORCE SYSTEMS COMMAND
LOS ANGELES AIR FORCE STATION
Los Angeles, California

Approved for public release;
distribution unlimited

*Currently with R&D Associates, Santa Monica

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. Department of Commerce
Springfield VA 22151

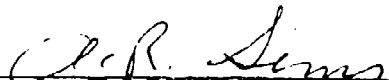
ic


FOREWORD

This report is published by The Aerospace Corporation, El Segundo, California, under Air Force Contract No. F04701-73-C-0074. This report was prepared by the Information Processing Division, Engineering Science Operations, at the request of the Reentry Systems Division, Development Operations.

This report, which documents research carried out from April 1970 to December 1972 was submitted for review and approval on 13 September 1973 to Capt. A. Klingler, RSSE.

Approved by


A.R. Sims, Director
Mathematics and Programming
Subdivision
Information Processing Division
Engineering Science Operations


R.G. Allen, Group Director
Ballistic Reentry Vehicles
Reentry Systems Division
Development Operations

Publication of this report does not constitute Air Force approval of the report's findings or conclusions. It is published only for the exchange and stimulation of ideas.


A. C. Klingler, Captain, USAF
Project Officer, RSSE

Preceding page blank

ABSTRACT

An iteration method for solving the implicit difference equations associated with three-dimensional nonlinear parabolic differential equations is derived and analyzed. The method is applied to the high Reynolds number laminar viscous flow around a cone at high angle of attack. The requirements which must be met to ensure convergence of the iterations are obtained. In addition, an analysis of the stability of the difference equations is presented and discussed. The numerical results are compared with experimental data for a 10-deg cone at 12-deg angle of attack, and a 5.6-deg cone at 8-deg angle of attack. The agreement is very good.

A description of the associated computer program is contained in the appendices.

Preceding page blank

CONTENTS

FOREWORD	iii
ABSTRACT	v
SYMBOLS	xi
I. INTRODUCTION	1
II. NUMERICAL TECHNIQUE	3
III. APPLICATION TO CONE AT ANGLE OF ATTACK	9
A. Governing Equations	9
B. Convergence and Stability	16
IV. NUMERICAL RESULTS	23
V. COMPUTER PROGRAM	35
VI. DISCUSSION AND CONCLUSIONS	37
REFERENCES	39
APPENDICES:	
A. PROGRAM INPUT INSTRUCTIONS	A-1
B. PROGRAM OUTPUT	B-1
C. EXAMPLE PROBLEM	C-1
D. INPUT FOR TRACY'S CASE	D-1
E. OUTPUT FROM TRACY'S CASE	E-1
F. PROGRAM LISTING	F-1

Preceding page blank

TABLES

I.	Parameters for Tracy's Case	23
II.	Parameters for Stetson's Case	33

FIGURES

1.	Coordinate System	10
2.	Geometry of the Flow for Tracy's Case, $\alpha = 12$ deg.	25
3.	Circumferential Surface Pressure Distribution for Tracy's Case, $\alpha = 12$ deg	26
4.	Circumferential Heat Transfer Distribution for Tracy's Case, $\alpha = 12$ deg	27
5.	$y - \phi$ Velocity Vector Distribution for Tracy's Case, $\alpha = 12$ deg	28
6.	Comparison of Analytical and Numerical Results	29
7.	Leeward Surface Pressure for Different Values of Δx and Δy	31
8.	Circumferential Surface Pressure Distribution for Stetson's Case, $\alpha = 8$ deg.	32
C-1.	Streamwise Velocity Profiles for Tracy's Case, $\alpha = 12$ deg	C-2
C-2.	Normal Velocity Profiles for Tracy's Case, $\alpha = 12$ deg	C-3
C-3.	Circumferential Velocity Profiles for Tracy's Case, $\alpha = 12$ deg	C-4
C-4.	Pressure Profiles for Tracy's Case, $\alpha = 12$ deg	C-5
C-5.	Enthalpy Profiles for Tracy's Case, $\alpha = 12$ deg	C-6

SYMBOLS

h	static enthalpy ($h = \tilde{h}/\tilde{h}_\infty$)
j, k, ℓ	finite-difference grid points in x, y, Φ directions, respectively
K, L	number of mesh points in y and Φ directions, respectively
\mathcal{L}	length used to nondimensionalize variables
M_∞	free stream Mach number
M_x	local streamwise Mach number ($M_x = uM_\infty/\sqrt{h}$)
p	dimensionless pressure ($p = \tilde{p}/\tilde{p}_\infty \tilde{V}_\infty^2$)
Pr	freestream Prandtl number (assumed constant)
r	distance from a point in the flow to the axis of symmetry of the cone ($r = x \sin \theta + y \cos \theta$)
Re	free stream Reynolds number ($Re = \frac{\tilde{p}_\infty \tilde{V}_\infty \mathcal{L}}{\tilde{\mu}_\infty}$)
S	Sutherland constant
u, v, w	dimensionless velocity components in x, y, Φ directions, respectively ($u = \tilde{u}/\tilde{V}_\infty, v = \tilde{v}/\tilde{V}_\infty, w = \tilde{w}/\tilde{V}_\infty$)
V_∞	free stream velocity ($V_\infty = \tilde{V}_\infty/\tilde{V}_\infty = 1$)
x, y, Φ	coordinates along the cone, normal to the cone, around the cone, respectively ($x = \tilde{x}/\mathcal{L}, y = \tilde{y}/\mathcal{L}$)
α	angle of attack
γ	ratio of specific heats (assumed constant)
$\Delta x, \Delta y, \Delta \Phi$	mesh spacing in x, y, Φ directions, respectively
η	transformed normal coordinate ($\eta = y/\mathcal{L}$)
θ	cone half angle
μ	viscosity [$\mu = \sqrt{h} (1+S)/(1+S/h)$]

Preceding page blank

SYMBOLS (Continued)

ξ distance from shock to cone surface
 ρ density ($\rho = \gamma M_{\infty}^2 p/h$)

Subscripts

∞ denotes free stream conditions
 w denotes conditions at the cone

Superscripts

\sim denotes dimensional quantity
 n denotes iteration number

SECTION I

INTRODUCTION

In recent years there has been a tremendous increase in numerical solutions for three-dimensional flow problems. This increase has been due to the rapid growth in the storage capacity and speed of computers. The primary effort in computing three-dimensional flows has been in using explicit methods. Explicit methods, although relatively easy to program, consume excessive amounts of computer time due to stability restrictions on step sizes. Even a DuFort-Frankel (Ref. 1) or Crocco (Ref. 2) scheme uses a considerable amount of time when the mesh spacing is small, as is necessary for accuracy with high speed, high Reynolds number laminar flow problems. Therefore, for many flow problems it is desirable to use an implicit technique to solve the governing partial differential equations. Implicit methods have the advantage of being stable, consistent, and accurate for reasonable stepsizes. The major drawback is the size and complexity of the computer program which must be written and the storage requirements due to the necessity of solving large systems of equations. Alternating direction implicit methods (Ref. 3), although reducing the size of the system of equations which must be solved for three-dimensional problems, double the complexity of the computer code which must be developed.

In this report, a method of solving the large system of algebraic equations which result from the implicit differencing of three-dimensional flow equations is developed. For a typical problem, the implicit differencing may result in a system of 6000 or more algebraic equations. A method of solving these equations which does not require excessive computer storage and that yields accurate results is presented. The method is similar to the "predictor corrector" multiple iteration technique described by Rubin and Lin (Ref. 4).

The numerical approach begins with an implicit differencing of the system of nonlinear partial differential equations. The nonlinear algebraic

equations resulting from this differencing are first linearized, and the resulting linear algebraic equations are then solved using a Gauss-Seidel (Ref. 5) iteration method. The details of the method are given in Section II for a simple model equation. Because of the necessity of iterating, which results from the numerical approach, the convergence of the iteration should be considered. This question is also analyzed in Section II for the model equation.

In Section III, the numerical technique which is developed is applied to the solution of an approximate system of three-dimensional equations which has been developed to predict the flow fields around cones at high angles of attack. This approximate system of viscous equations has been derived from the steady Navier-Stokes equations by assuming the gradients of the shear stress in the streamwise direction are much smaller than the gradients in the normal and circumferential directions (Ref. 6). The resulting equations are similar to those developed by Lin and Rubin (Ref. 7) to solve the sharp tip, low Reynolds number region for a cone at angle of attack. The resulting system of equations is first order in x and second order in y and ϕ . The convergence and stability of the system of equations are discussed.

Solutions to the system of equations are presented for two cases in Section IV. The first, a 10-deg half angle cone at 12-deg angle of attack and a freestream Mach number of 8; and the second, a 5.6-deg half angle cone at 8-deg angle of attack and a freestream Mach number of 14.2. The conditions for these cases correspond closely to experimental data obtained by Tracy (Ref. 8) and Stetson and Ojdana (Ref. 9). Comparisons of the numerical results with the experimental data are shown.

SECTION II

NUMERICAL TECHNIQUE

In this section, the numerical technique is developed and analyzed. To illustrate the approach, the following three-dimensional partial differential equation is considered:

$$\frac{\partial u}{\partial x} + a \frac{\partial u}{\partial \eta} + b \frac{\partial u}{\partial \Phi} - c \frac{\partial^2 u}{\partial \eta^2} - d \frac{\partial^2 u}{\partial \Phi^2} = 0 \quad c, d \geq 0 \quad (1)$$

This equation is representative of the viscous flow equation. For three-dimensional steady flow, $a = v/u$, $b = w/ur$, $c = \mu/Re\rho u$, $d = \mu/Re\rho ur^2$.

The following finite difference approximation formulas are used:

$$\begin{aligned} \frac{\partial u}{\partial x} &= (u_{j+1,k,l} - u_{j,k,l})/\Delta x \\ \frac{\partial u}{\partial \eta} &= (u_{j+1,k+1,l} - u_{j+1,k-1,l})/2\Delta \eta \\ \frac{\partial^2 u}{\partial \eta^2} &= (u_{j+1,k+1,l} - 2u_{j+1,k,l} + u_{j+1,k-1,l})/\Delta \eta^2 \\ \frac{\partial u}{\partial \Phi} &= (u_{j+1,k,l+1} - u_{j+1,k,l-1})/2\Delta \Phi \\ \frac{\partial^2 u}{\partial \Phi^2} &= (u_{j+1,k,l+1} - 2u_{j+1,k,l} + u_{j+1,k,l-1})/\Delta \Phi^2 \end{aligned} \quad (2)$$

where $u_{j,k,l}$ is the value of u at the grid point j,k,l .

In addition, in the more general case, a cross derivative term appears. For completeness the difference formula is defined.

$$\frac{\partial^2 u}{\partial \eta \partial \Phi} = [(u_{j+1, k+1, \ell+1} - u_{j+1, k-1, \ell+1}) - (u_{j+1, k+1, \ell-1} - u_{j+1, k-1, \ell-1})] / 4\Delta\eta\Delta\Phi \quad (3)$$

The scheme for solving the differential equation is then completely implicit. To obtain $u_{j+1, k, \ell}$ (solution known at j) a linear system of equations of order $K * L$ must be solved.

The method proposed to solve this system of linear equations is the line Gauss-Seidel iteration method mentioned in Fox (Ref. 5) and Isaacson and Keller (Ref. 10). To be specific, suppose $u_{j+1, k, \ell}^n$ is a guess to the solution of the difference equations where n denotes the iteration number. Then the correction $\bar{u}_{j+1, k, \ell}$ which must be added to $u_{j+1, k, \ell}^n$ to give the solution satisfies, after rearranging

$$\begin{aligned} & \left(-\frac{a}{2\Delta\eta} - \frac{c}{\Delta\eta^2}\right) \bar{u}_{j+1, k-1, \ell} + \left(\frac{1}{\Delta x} + \frac{2c}{\Delta\eta^2} + \frac{2d}{\Delta\Phi^2}\right) \bar{u}_{j+1, k, \ell} + \left(\frac{a}{2\Delta\eta} - \frac{c}{\Delta\eta^2}\right) \bar{u}_{j+1, k+1, \ell} \\ & = -\frac{\partial u^n}{\partial x} - a \frac{\partial u^n}{\partial \eta} - b \frac{\partial u^n}{\partial \Phi} + c \frac{\partial^2 u^n}{\partial \eta^2} + d \frac{\partial^2 u^n}{\partial \Phi^2} - \frac{b}{2\Delta\Phi} (\bar{u}_{j+1, k, \ell+1} - u_{j+1, k, \ell-1}) \\ & + \frac{d}{\Delta\Phi^2} (\bar{u}_{j+1, k, \ell+1} + \bar{u}_{j+1, k, \ell-1}) \end{aligned} \quad (4)$$

If the underlined terms on the right hand side of Eq. (4) are ignored and the resulting equations are solved in the order $\ell = 1, 2, \dots, L$, using the boundary conditions at $\ell = 1$, then the approximate solution denoted by $\bar{U}_{j+1, k, \ell}$ should be close to $\bar{u}_{j+1, k, \ell}$. Taking $u_{j+1, k, \ell}^{n+1} = u_{j+1, k, \ell}^n + \bar{U}_{j+1, k, \ell}$ as a new guess to the solution of Eq. (1) the process is repeated to obtain $u_{j+1, k, \ell}^{n+2}$ and so on until convergence is achieved.

The above method has the advantage that L systems of order K must be solved instead of one of order $L * K$. This saves time and storage.

A seeming disadvantage is that iteration is required. That is, solving L systems of order K just produces a "guess" to the solution of Eq. (4). To obtain a better "guess" the L systems have to be solved again, etc.

However for nonlinear problems this is not a disadvantage. To solve a nonlinear system of equations, some form of linearization must be done (e.g., Newton-Raphson method) and then iteration is done to obtain an accurate solution. The line Gauss-Seidel method may be used to solve the linear system, and instead of iterating to convergence the first iterate is taken as the next iterate in the nonlinear sequence of iterates. Experience has shown that the convergence of the nonlinear iterates is not severely hindered by not solving exactly for the iterate.

Once the iterations have converged then the method is completely implicit and so the single linear Eq. (i) is stable and consistent. The primary question to be answered is whether or not the iterates converge. To consider the convergence question write the difference equation [Eq. (4)] as

$$\begin{aligned} u_{j+1,k,l}^{n+1} + \frac{c\Delta x}{2\Delta\eta} \left(u_{j+1,k+1,l}^{n+1} - u_{j+1,k-1,l}^{n+1} \right) + \frac{b\Delta x}{2\Delta\phi} \left(u_{j+1,k,l+1}^n - u_{j+1,k,l-1}^{n+1} \right) \\ - \frac{c\Delta x}{\Delta\eta^2} \left(u_{j+1,k+1,l}^{n+1} - 2u_{j+1,k,l}^{n+1} + u_{j+1,k-1,l}^{n+1} \right) \\ - \frac{d\Delta x}{\Delta\phi^2} \left(u_{j+1,k,l+1}^n - 2u_{j+1,k,l}^{n+1} + u_{j+1,k,l-1}^{n+1} \right) = u_{j,k,l} \end{aligned} \quad (5)$$

The above equation is a difference equation with difference index n . To determine under what conditions the solution converges as $n \rightarrow \infty$ the Fourier series method as presented in Richtmyer and Morton (Ref. 11) may be used. That is, substitute $\lambda e^{i(m_1 l \Delta\phi + m_2 k \Delta\eta)}$ for $u_{j+1,k,l}^{n+1}$ and $e^{i(m_1 l \Delta\phi + m_2 k \Delta\eta)}$ for $u_{j+1,k,l}^n$. The term $u_{j,k,l}$ is ignored since it is independent of n , and

the resulting equation is solved for λ . The iterates will converge if $|\lambda| < 1$. For Eq. (5) the amplification factor λ is

$$\lambda = \frac{-\left(\frac{b\Delta x}{2\Delta\phi} + \frac{d\Delta x}{\Delta\phi^2}\right)(\cos m_1\Delta\phi + i\sin m_1\Delta\phi)}{1 - \left(\frac{b\Delta x}{2\Delta\phi} + \frac{d\Delta x}{\Delta\phi^2}\right)\cos m_1\Delta\phi - \frac{c\Delta x}{\Delta\eta^2}(\cos r_2\Delta\eta - 1) + \frac{2d\Delta x}{\Delta\phi^2} + \frac{a\Delta x}{\Delta\eta}i\sin m_2\Delta\eta + \left(\frac{b\Delta x}{2\Delta\phi} + \frac{d\Delta x}{\Delta\phi^2}\right)i\sin m_1\Delta\phi} \quad (6)$$

After some manipulation it can be shown that $|\lambda| < 1$ if $\Delta x < \frac{\Delta\phi}{|b|}$.

If the values of u at $\ell-1$ were evaluated at the n^{th} iterate instead of the $n+1^{\text{th}}$, this would be the line Jacobi elimination method (Ref. 10) and the convergence criterion would be the same. It is line Jacobi elimination that Rubin and Lin (Ref. 4) studied; however, instead of considering convergence they looked at what would happen if just one or two iterations were carried out. They found that the equations were not quite consistent and for the method to be stable as a marching scheme in x there was a restriction on Δx depending on the number of iterations performed. For one iteration, the stability restriction was the same as the above derived convergence restriction. (Rubin and Lin considered the case where $c = 0$.) The question may be asked why it is necessary to iterate to convergence (which may require four or five iterations) instead of iterating only once or twice. Iterating to convergence produces consistency, and in nonlinear equations it is necessary to iterate several times to obtain an accurate and stable solution to the nonlinear difference equations.

The rates of convergence for the line Jacobi method and the line Gauss-Seidel method have been studied for elliptic problems (Ref. 10) and it has been found that the line Gauss-Seidel method converges twice as fast as the line Jacobi method. The results for the above simple parabolic case are analogous.

If a DuFort-Frankel scheme or a Crocco scheme or some other modified explicit formula (modified to remove the diffusive stability requirement)

is used, there are two convective stability requirements. The above scheme eliminates one convective Δx restriction. For problems which permit very unequal meshes in the two directions, as for many flow problems, this may permit much greater step sizes.

In the next section, the differencing described above is applied to a complicated system of three-dimensional viscous flow equations which have been developed to solve for the flow field around a cone at angle of attack.

SECTION III

APPLICATION TO CONE AT ANGLE OF ATTACK

A. GOVERNING EQUATIONS

The numerical technique which was developed in the previous section will be applied to a complicated system of three-dimensional viscous flow equations which have been derived to predict the flow around a cone at angle of attack. The system of equations has been derived from the steady Navier-Stokes equations by assuming the gradients of the shear stress in the stream-wise direction are much smaller than the gradients in the normal and circumferential directions (Ref. 6). The coordinate system used in the development of the equations is illustrated in Figure 1.

The resulting nondimensional equations are listed below:

Continuity equation

$$\frac{\partial \rho u r}{\partial x} + \frac{\partial \rho v r}{\partial y} + \frac{\partial \rho w}{\partial \Phi} = 0 \quad (7)$$

x-momentum equation

$$\begin{aligned} \frac{\partial \rho u^2 r}{\partial x} + \frac{\partial \rho u v r}{\partial y} + \frac{\partial \rho w u}{\partial \Phi} - \rho w^2 \sin \theta + r \frac{\partial p}{\partial x} \\ = \frac{r}{Re} \left\{ \frac{\partial}{\partial y} \left(\mu \frac{\partial u}{\partial y} \right) + \frac{1}{r^2} \frac{\partial}{\partial \Phi} \left(\mu \frac{\partial u}{\partial \Phi} \right) + \frac{\mu}{r} \frac{\partial u}{\partial y} \cos \theta \right\} \end{aligned} \quad (8)$$

Preceding page blank

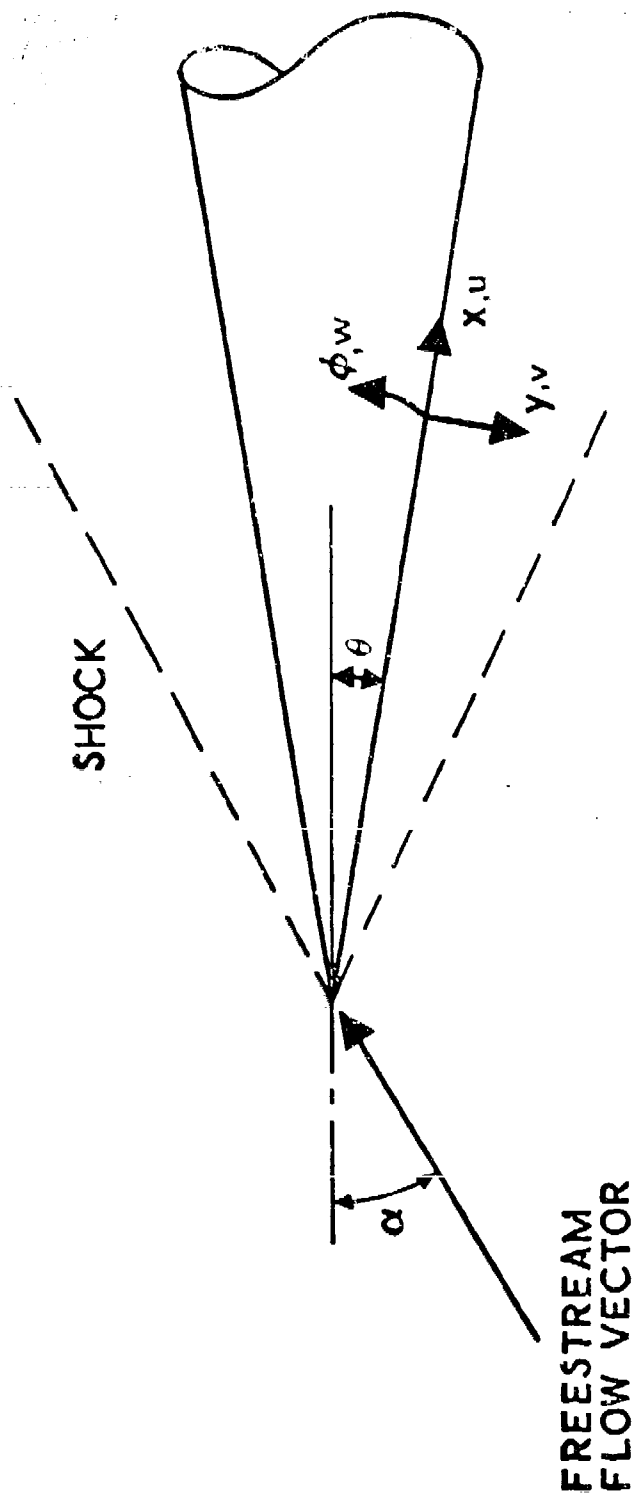


Figure 1. Coordinate System

y-momentum equation

$$\begin{aligned}
 \frac{\partial \rho v r}{\partial x} + \frac{\partial \rho v^2 r}{\partial y} + \frac{\partial \rho v w}{\partial \Phi} - \rho w^2 \cos \theta + r \frac{\partial p}{\partial y} \\
 = \frac{r}{Re} \left\{ \frac{4}{3} \frac{\partial}{\partial y} \left(\mu \frac{\partial v}{\partial y} \right) + \frac{1}{r^2} \frac{\partial}{\partial \Phi} \left(\mu \frac{\partial v}{\partial \Phi} \right) \right. \\
 \left. + \frac{1}{r} \frac{\partial}{\partial \Phi} \left(\mu \frac{\partial w}{\partial y} \right) - \frac{2}{3} \frac{\partial}{\partial y} \left(\frac{\mu}{r} \frac{\partial w}{\partial \Phi} \right) \right\}
 \end{aligned} \quad (9)$$

Φ -momentum equation

$$\begin{aligned}
 \frac{\partial \rho u r}{\partial x} + \frac{\partial \rho v r}{\partial y} + \frac{\partial \rho w^2}{\partial \Phi} + \rho u w \sin \theta + \rho v w \cos \theta + \frac{\partial p}{\partial \Phi} \\
 = \frac{r}{Re} \left\{ \frac{\partial}{\partial y} \left(\frac{\mu}{r} \frac{\partial v}{\partial \Phi} \right) - \frac{2}{3r} \frac{\partial}{\partial \Phi} \left(\mu \frac{\partial v}{\partial y} \right) + \frac{\partial}{\partial y} \left(\mu \frac{\partial w}{\partial y} \right) + \frac{4}{3r^2} \frac{\partial}{\partial \Phi} \left(\mu \frac{\partial w}{\partial \Phi} \right) \right\}
 \end{aligned} \quad (10)$$

Energy equation

$$\begin{aligned}
 \frac{\partial \rho u r h}{\partial x} + \frac{\partial \rho v r h}{\partial y} + \frac{\partial \rho w h}{\partial \Phi} = (\gamma - 1) M_\infty^2 r \left\{ u \frac{\partial p}{\partial x} + v \frac{\partial p}{\partial y} + \frac{w}{r} \frac{\partial p}{\partial \Phi} \right\} \\
 + \frac{\mu r (\gamma - 1) M_\infty^2}{Re} \left\{ \left(\frac{\partial u}{\partial y} \right)^2 + \frac{1}{r^2} \left(\frac{\partial u}{\partial \Phi} \right)^2 + \left(\frac{\partial w}{\partial y} \right)^2 + \frac{4}{3r^2} \left(\frac{\partial w}{\partial \Phi} \right)^2 \right. \\
 + \frac{4}{3} \left(\frac{\partial v}{\partial y} \right)^2 + \frac{1}{r^2} \left(\frac{\partial v}{\partial \Phi} \right)^2 - \frac{4}{3r} \frac{\partial v}{\partial y} \frac{\partial w}{\partial \Phi} + \frac{2}{r} \frac{\partial v}{\partial \Phi} \frac{\partial w}{\partial y} \left. \right\} \\
 + \frac{r}{Re Pr} \left\{ \frac{1}{r} \frac{\partial}{\partial y} \left(r \mu \frac{\partial h}{\partial y} \right) + \frac{1}{r^2} \frac{\partial}{\partial \Phi} \left(\mu \frac{\partial h}{\partial \Phi} \right) \right\}
 \end{aligned} \quad (11)$$

where the perfect gas equation of state is used to relate the density to the pressure and enthalpy

$$\rho = \gamma M_\infty^2 \frac{p}{h} \quad (12)$$

and Sutherland's law is used to relate the viscosity to the enthalpy

$$\mu = \sqrt{h} \frac{1+S}{1+S/h} \quad (13)$$

A constant Prandtl number and specific heat will also be assumed.

The above equations are similar to those used by Lin and Rubin (Ref. 7) except the terms associated with $r \rightarrow 0$ have been dropped. These terms are important only near the tip at low Reynolds number. We will be interested in solving the higher Reynolds number cases downstream of the tip region. The following boundary conditions at the cone surface are used.

$$u = v = w = 0$$

$$h_w = \text{specified constant} \quad (14)$$

$$\left(\frac{\partial p}{\partial y} \right)_w = \frac{1}{\text{Re}} \left(\frac{4}{3} \mu \frac{\partial^2 v}{\partial y^2} + \frac{1}{r} \mu \frac{\partial^2 w}{\partial y \partial \Phi} \right)$$

The last equation has been obtained from the v -momentum equation using the condition $(\partial v / \partial y)_w = 0$ which is required in order that the continuity equation is satisfied at the wall.

The following difference formulas are used in the $(\partial p / \partial y)_w$ equation:

$$\left(\frac{\partial^2 w}{\partial y \partial \Phi} \right)_w = \frac{\partial w}{\partial \Phi} \Big|_{k=2} / \Delta y$$

$$\left(\frac{\partial^2 v}{\partial y^2} \right)_w = 2v_{k=2} / \Delta y^2$$

and are obtained from Taylor series expansions in the normal direction of $\frac{\partial w}{\partial \Phi} \Big|_{k=2}$ and $v_{k=2}$.

The Rankine-Hugoniot jump conditions are applied at the shock boundary. In the body-oriented coordinate system (Figure 1) they are

Conservation of mass equation

$$(u_{\infty} - \rho_K u_K) \frac{\partial \xi}{\partial x} - (v_{\infty} - \rho_K v_K) + (w_{\infty} - \rho_K w_K) \frac{1}{r} \frac{\partial \xi}{\partial \Phi} = 0 \quad (15)$$

Conservation of normal momentum equation

$$\frac{\left(u_{\infty} \frac{\partial \xi}{\partial x} - v_{\infty} + w_{\infty} \frac{1}{r} \frac{\partial \xi}{\partial \Phi}\right)^2}{\left(\frac{\partial \xi}{\partial x}\right)^2 + 1 + \left(\frac{1}{r} \frac{\partial \xi}{\partial \Phi}\right)^2} + p_{\infty} = p_K + \frac{\left(u_K \frac{\partial \xi}{\partial x} - v_K + w_K \frac{1}{r} \frac{\partial \xi}{\partial \Phi}\right)^2}{\left(\frac{\partial \xi}{\partial x}\right)^2 + 1 + \left(\frac{1}{r} \frac{\partial \xi}{\partial \Phi}\right)^2} \quad (16)$$

Conservation of tangential velocities equations

$$(u_{\infty} - u_K) \left[1 + \left(\frac{1}{r} \frac{\partial \xi}{\partial \Phi}\right)^2 \right] + (v_{\infty} - v_K) \frac{\partial \xi}{\partial x} - (w_{\infty} - w_K) \frac{1}{r} \frac{\partial \xi}{\partial \Phi} \frac{\partial \xi}{\partial x} = 0$$

$$(v_{\infty} - v_K) \frac{1}{r} \frac{\partial \xi}{\partial \Phi} + (w_{\infty} - w_K) = 0 \quad (17)$$

Conservation of energy equation

$$\frac{(\gamma-1)M_{\infty}^2}{2} v_{\infty}^2 + h_{\infty} = h_K + \frac{(\gamma-1)M_{\infty}^2}{2} (u_K^2 + v_K^2 + w_K^2) \quad (18)$$

The subscript K denotes the value of the variable just inside the shock. In order to uniquely determine the six unknowns ξ , u_K , v_K , w_K , p_K , h_K , the above five equations must be augmented with a sixth equation. A one-sided differencing of the continuity equation provides the sixth equation. Full justification and discussion of the above equations and boundary conditions are presented in Ref. 6).

Since the fluid flow is symmetric about the plane $\Phi = 0$ and $\Phi = \pi$, the equations used will be solved for $0 \leq \Phi \leq \pi$ where the symmetry conditions

$$\frac{\partial}{\partial \Phi} (u, v, p, h, \xi) = 0; \quad w = \frac{\partial^2 w}{\partial \Phi^2} = 0 \quad (19)$$

are used at $\Phi = 0$ and $\Phi = \pi$. (Note: $\Phi = 0$ is the windward side.)

The shock distance is to be solved for from the Rankine-Hugoniot jump conditions. In a rectangular y - Φ grid the shock may not fall on a mesh point so that mesh points would have to be moved or added to accommodate the shock. Thus, the transformation $\eta = y/\xi(x, \Phi)$ is made. The resulting equations are then solved for $0 \leq \eta \leq 1$, $0 \leq \Phi \leq \pi$, where $\eta = 0$ corresponds to the cone and $\eta = 1$ corresponds to the shock. The shock distance ξ appears in all the equations and in order to keep the matrix of coefficients obtained from the difference form of the equation in block tri-diagonal form, a sixth equation

$$\frac{\partial \xi}{\partial \eta} = 0 \quad (20)$$

is differenced. Thus the problem to be solved consists of six differential equations, six boundary conditions at each of the positions $\eta = 0$ and $\eta = 1$ and two symmetry conditions at $\Phi = 0$ and $\Phi = \pi$ [Eqs. (7) through (20)] in the six unknowns u, v, w, p, h, ξ .

If initial conditions were known, a marching scheme in x could be used to solve the equations. An explicit method would not work since, as shown by Baum and Denison [Eq. (12)] for the axisymmetric problem, it is not possible to solve for $\partial u/\partial x$, $\partial v/\partial x$, $\partial w/\partial x$, $\partial p/\partial x$, $\partial h/\partial x$, at $M_x = 1$. Even if this difficulty could be overcome the diffusive stability requirement would be too strict. Since the gradients in the normal direction are much larger than in the circumferential direction, the normal mesh will be much finer than the circumferential mesh. Thus a method that is implicit in the normal direction should be more efficient than a modified explicit differencing such as DuFort-Frankel or Crocco. Accurate solutions at each x -station are desired

and since the equations are very nonlinear they require iteration for accuracy. The method proposed in the previous section is most appropriate for this problem.

An alternating direction implicit technique was tried, with iteration to handle the nonlinearities. It was found that near $u = 0$ and $M_x = 1$, the equations for the implicit in Φ step were ill-conditioned and meaningful solutions could not be obtained. The $M_x = 1$ difficulty was overcome by evaluating the $\partial p / \partial x$ term backwards in x in the x -momentum and energy equations. However, the $u = 0$ difficulty remained.

The implicit difference equations [Eqs. (2) and (3)] are substituted into the partial differential equations and a system of nonlinear algebraic equations result. There are many ways to linearize such a system. Since convergence is guaranteed provided the initial guess is close enough, and because the convergence is quadratic, the Newton-Raphson method is used to solve these equations. That is, the nonlinear terms are expanded in a Taylor series and terms higher than first order are dropped. It is known that this iteration procedure converges provided the initial guess is close enough to the solution. It was found that linearly extrapolating the solution at the previous two x stations gives a satisfactory initial guess. To see what linearization does to various terms let $\bar{}$ represent the increment to be added to the known iterate and the superscript n denote that iterate. A few sample expressions are

$$\begin{aligned}\frac{\partial \rho u r}{\partial x} &= \left(\frac{\partial \rho u r}{\partial x} \right)^n + \bar{u} \frac{(\rho r)^n}{\Delta x} + \frac{(u r)^n}{\Delta x} \left(\frac{\partial \rho}{\partial p} \bar{p} + \frac{\partial \rho}{\partial h} \bar{h} \right) + \bar{r} \frac{(\rho u)^n}{\Delta x} \\ \frac{\partial \rho w}{\partial \Phi} &= \left(\frac{\partial \rho w}{\partial \Phi} \right)^n + \frac{\partial (\rho^n \bar{w})}{\partial \Phi} + \frac{\partial}{\partial \Phi} \left(w^n \frac{\partial \rho}{\partial p} \bar{p} + w^n \frac{\partial \rho}{\partial h} \bar{h} \right) \\ \mu \frac{\partial^2 v}{\partial \Phi^2} &= \left(\mu \frac{\partial^2 v}{\partial \Phi^2} \right)^n + \bar{h} \left(\frac{d\mu}{dh} \frac{\partial^2 v}{\partial \Phi^2} \right)^n + \mu^n \frac{\partial^2 \bar{v}}{\partial \Phi^2}\end{aligned}$$

The \bar{r} term above is $\bar{r} = \bar{\xi} \eta \cos \Phi$, since $x_{j+1} \sin \theta$ is known. The linear system of equations obtained are solved for $\bar{u}, \bar{v}, \bar{w}, \bar{p}, \bar{h}$, and $\bar{\xi}$ using the line Gauss-Seidel method described in the previous section. However, only one iteration of the line Gauss-Seidel method is performed. The approximate solutions so obtained are then used to obtain the next guess to the nonlinear system.

For this flow problem the L systems of equations that must be solved to obtain one Gauss-Seidel iterate are of order $6 * K$ since there are six variables involved. The matrix of coefficients is of block tridiagonal form. An efficient method for solving such systems is presented in Isaacson and Keller (Ref. 10) and was used by Rubin and Lin (Ref. 4) and also in the present analysis.

B. CONVERGENCE AND STABILITY

The questions of convergence and stability must be investigated for the system of flow equations. To consider convergence, the equations are simplified. First the equations are written in a different form by expanding the derivative expressions and subtracting the continuity equation from the momentum equation and the energy equation. For simplicity it is assumed that $\mu/Pr = 4/3$ $\mu = \mu$. The viscosity is assumed to be constant and the shock distance is assumed to be known. Since the iteration is primarily for the Φ derivative terms, then all terms not involving derivatives with respect to Φ exclusively are ignored. The following equations are left.

$$\begin{aligned} \frac{\partial u}{\partial x} + \frac{1}{\rho u} \frac{\partial p}{\partial x} + \frac{w}{ur} \frac{\partial u}{\partial \Phi} - Re^* \frac{\partial^2 u}{\partial \Phi^2} &= 0 \\ \frac{\partial v}{\partial x} + \frac{w}{ur} \frac{\partial v}{\partial \Phi} - Re^* \frac{\partial^2 v}{\partial \Phi^2} &= 0 \\ \frac{\partial w}{\partial x} + \frac{w}{ur} \frac{\partial w}{\partial \Phi} - Re^* \frac{\partial^2 w}{\partial \Phi^2} + \frac{h}{ur \gamma M_{\infty}^2} \frac{\partial p}{\partial \Phi} &= 0 \end{aligned} \quad (21a)$$

$$\frac{\partial p}{\partial x} + \frac{p}{u} \frac{\partial u}{\partial x} - \frac{p}{h} \frac{\partial h}{\partial x} + \frac{w}{ur} \frac{\partial p}{\partial \phi} + \frac{p}{ur} \frac{\partial w}{\partial \phi} - \frac{w}{ur} \frac{p}{h} \frac{\partial h}{\partial \phi} = 0$$

(21b)

$$\frac{\partial h}{\partial x} - \frac{\gamma-1}{\gamma} \frac{h}{p} \frac{\partial p}{\partial x} + \frac{w}{ur} \frac{\partial h}{\partial \phi} - Re^* \frac{\partial^2 h}{\partial \phi^2} - \frac{\gamma-1}{\gamma} \frac{w}{ur} \frac{h}{p} \frac{\partial p}{\partial \phi} = 0$$

where

$$Re^* = \frac{1}{Re} \frac{u h}{ur^2 \gamma M_{\infty}^2 p}$$

To further simplify the analysis, assume that all coefficients of the derivative terms are constant, and that the mesh spacings are constant Δx , Δy , and $\Delta \phi$ in the x , y , and ϕ directions, respectively. After differencing and some rearranging, the line Gauss-Seidel iteration method reduces the difference equation for u at each mesh point to

$$u_{j+1,k,l}^{n+1} + \frac{1}{\rho u} p_{j+1,k,l}^{n+1} + \frac{w}{ur} \frac{\Delta x}{2\Delta \phi} \left(u_{j+1,k,l+1}^n - u_{j+1,k,l-1}^{n+1} \right) - Re^* \frac{\Delta x}{\Delta \phi^2} \left(u_{j+1,k,l+1}^n - 2u_{j+1,k,l}^{n+1} + u_{j+1,k,l-1}^{n+1} \right) = u_{j,k,l} + \frac{1}{\rho u} p_{j,k,l}$$

(22)

with similar expressions for the other equations, where the superscript n denotes the known iterate, the superscript $n+1$ denotes the next (unknown) iterate, and the right hand side of the equations are at j and so are independent of the iterate.

The convergence of the solution of the system of difference equations represented by Eq. (22) can be determined using the Fourier series method as presented in Ref. 11. The solutions will converge if the eigenvalues of the associated amplification matrix are less than one in absolute value. To

obtain the eigenvalues substitute $u_o e^{iml\Delta\Phi}$ and $\lambda u_o e^{iml\Delta\Phi}$ for $u_{j+1,k,l}^n$ and $u_{j+1,k,l}^{n+1}$, and similarly for v, w, p, h ; this gives five linear equations in u_o, v_o, w_o, p_o , and h_o , and the eigenvalues of the amplification matrix are those values of λ for which the determinant of the coefficient matrix is zero.

For the above system it has been found in regions of the flow where M_x is near one or less than one, that some of the eigenvalues of the amplification matrix are greater than one, in absolute value, independent of Δx and $\Delta\Phi$. However, if the $\partial p / \partial x$ term in the x-momentum and energy equations are differenced backwards in x , i.e.

$$\frac{\partial p}{\partial x} = \frac{p_{j,k,l} - p_{j-1,k,l}}{\Delta x} \quad (23)$$

as suggested by Ohrenberger and Baum (Ref. 13), or set equal to zero as suggested by Rubin and Lin (Ref. 14), then convergence criteria can be obtained. Doing either of the above modifications causes the difference expressions representing the underlined terms in Eq. (21) to be independent of the iteration index n . Thus, the first and second difference equations are uncoupled from the rest of the system and are similar to the simple equation in Section II. Therefore $|\lambda| < 1$ if

$$\Delta x < \left| \frac{ur}{w} \right| \Delta\Phi \quad (24)$$

The remaining three equations are studied using the Fourier series method. If the determinant of the associated three by three matrix of coefficients is set equal to zero, it can be found that a third value of λ is the same as the first two above, and so Eq. (24) must be satisfied. The remaining two values satisfy a complicated quadratic equation. To simplify the analysis the first and second derivative terms are handled separately. For second derivative terms only, it can be easily shown that both roots of the

quadratic equation are less than one in absolute value. For first derivative terms only, it can be shown after considerable effort that the two roots of the quadratic equation are less than one in absolute value if and only if

$$\Delta x < \frac{2 |ur| \Delta \Phi}{|w| \left(1 + \frac{1}{\gamma}\right) + \sqrt{\left(1 - \frac{1}{\gamma}\right)^2 w^2 + \frac{4h}{\gamma M_\infty^2}}} \quad (25)$$

The results as represented by Eqs. (24), (25) apply to the simplified linear system Eq. (21). It has been found numerically that the restriction for the actual nonlinear system of equations [Eqs. (7) through (20)] is qualitatively like Eqs. (24), (25). Quantitatively the restriction is similar to Eq. (24).

Once the solution can be obtained at x_{j+1} , the question of whether the scheme is stable for marching in the x direction must be answered. To analyze the stability, the following system is considered.

$$\begin{aligned} \frac{\partial u}{\partial x} + \frac{1}{\rho u} \frac{\partial p}{\partial x} - \text{Re}^* \left(\frac{\partial^2 u}{\partial \Phi^2} + r^2 \frac{\partial^2 u}{\partial y^2} \right) &= 0 \\ \frac{\partial v}{\partial x} - \text{Re}^* \left(\frac{\partial^2 v}{\partial \Phi^2} + r^2 \frac{\partial^2 v}{\partial y^2} \right) &= 0 \\ \frac{\partial w}{\partial x} - \text{Re}^* \left(\frac{\partial^2 w}{\partial \Phi^2} + r^2 \frac{\partial^2 w}{\partial y^2} \right) &= 0 \\ \frac{\partial p}{\partial x} + \frac{p}{u} \frac{\partial u}{\partial x} - \frac{p}{h} \frac{\partial h}{\partial x} &= 0 \\ \frac{\partial h}{\partial x} - \frac{\gamma-1}{\gamma} \frac{h}{p} \frac{\partial p}{\partial x} - \text{Re}^* \left(\frac{\partial^2 h}{\partial \Phi^2} + r^2 \frac{\partial^2 h}{\partial y^2} \right) &= 0 \end{aligned} \quad (26)$$

The above equations are differenced implicitly and the resulting equations are studied using the Fourier series technique. The equations are stable if the eigenvalues of the amplification matrix are less than or equal to one in absolute value. The second and third equations are uncoupled from the system. It can easily be shown that they are unconditionally stable.

For the remaining three equations one of the eigenvalues is $\lambda = 1$, and another is

$$\lambda = \frac{1}{1 - 2 \operatorname{Re}^* \left[(\cos m_1 \Delta \Phi - 1) \frac{\Delta x}{\Delta \Phi^2} + (\cos n_2 \Delta \Phi - 1) \frac{r^2 \Delta x}{\Delta y^2} \right]} \quad (27)$$

which is less than or equal to one in absolute value.

Since the first four eigenvalues are less than or equal to one in absolute value, the stability of the system of Eq. (26) depends on the magnitude of the fifth and final one. Three different cases are considered depending on how the $\partial p / \partial x$ term in the x-momentum and energy equations is differenced. In the first case, if $\partial p / \partial x$ is set to zero as suggested by Rubin and Lin (Ref. 14), then the fifth eigenvalue is the same as Eq. (27). Thus, the difference equations are unconditionally stable as a marching scheme in x.

The second case corresponds to evaluating $\partial p / \partial x$ backwards in x [Eq. (23)], as suggested by Ohrenberger and Baum (Ref. 13). If $M_x \geq 1$ then it can be shown that the magnitude of the eigenvalue is less than or equal to one. However, if $M_x < 1$, which occurs near the cone due to the boundary condition $u = 0$, the following restriction must be satisfied to ensure that the absolute value of the eigenvalue is less than or equal to one.

$$\Delta x \geq \left(\frac{1}{M_x^2} - 1 \right) \frac{1}{2Y \operatorname{Re}^*} \left[\frac{1}{(1 - \cos m_1 \Delta \Phi) \frac{1}{\Delta \Phi^2} + (1 - \cos n_2 \Delta \Phi) \frac{r^2}{\Delta y^2}} \right] \quad (28)$$

The third case corresponds to taking $\partial p / \partial x$ implicitly. For this case it is found that Δx must be twice as big as for the previous case where $\partial p / \partial x$ was evaluated explicitly. This implies that if a different method were used to solve the implicit equations (the proposed Newton-Gauss-Seidel method does not converge when $\partial p / \partial x$ is differenced implicitly as mentioned previously) a numerical solution to the fluid flow equations could be obtained if Δx were chosen sufficiently large. A lower bound restriction on the marching step-size has also been found for certain stiff ordinary differential equations by Curtiss and Hirschfelder (Ref. 15) in order to suppress so called departure solutions. The case here is analogous to the ordinary differential equation case. The departure is characterized by the leeward surface pressure oscillating or rapidly increasing, and has been observed by Baum and Denison (Ref. 12), Rubin and Lin (Ref. 14), and Tyson (Ref. 16). Tyson experimentally found that a large stepsize was necessary to suppress the departure solutions.

SECTION IV

NUMERICAL RESULTS

To demonstrate the validity of the technique, solutions have been compared with experimental data obtained by Tracy (Ref. 8) on a sharp 10 deg half angle cone at an angle of attack of 12 deg. The parameters used in the calculation are given in Table I. These correspond closely to the experimental data. Initial conditions, which would normally come from a solution to the nose region, are needed before an exact comparison can be obtained. Since the nose solution was not available, the following technique was used to generate the required initial conditions. Starting at zero, the angle of attack was slowly increased while marching along the cone until 12 deg was reached at an $x = x_0$. The calculations are then continued at a constant 12 deg angle of attack, and the solution is allowed to relax to the desired sharp cone results. Because of the method used to generate the initial conditions, the calculations are not expected to agree with the data at the same x station. However, the calculation should relax to results which are similar to the data (except the difference in local Reynolds number) as the solution continues downstream.

Table I. Parameters for Tracy's Case

Parameter	Symbol and Value
cone half angle	$\theta = 10 \text{ deg}$
angle of attack	$\alpha = 12 \text{ deg}$
freestream Mach number	$M_\infty = 8$
freestream Reynolds number	$Re = 1.1 \times 10^6 / \text{ft}$
freestream Prandtl number	$Pr = 0.75$
ratio of specific heats	$\gamma = 1.4$
Sutherland constant	$S = 2$
freestream dimensionless pressure	$p_\infty = 0.0112$
static enthalpy at the cone	$h_w = 5.5$

Figures 2, 3 show the experimental surface pressure and heat transfer around the cone at $x = 0.33$ ft and the calculated results at $\bar{x} \equiv x/x_0 = 8.5$, 25, and 50. The calculated heat transfer results illustrate that at $\bar{x} = 8.5$ the effect of the initial conditions at $x = x_0$ have not yet relaxed. At $x = 25$ and 50 the calculations appear to be approaching a relaxed result and the agreement with the heat transfer data is very good.

In Figure 4, a comparison between the measured and calculated bow shock and viscous layer thickness around the cone is given. The data were taken at $x = 0.286$ ft, the calculated results at $\bar{x} = 50$ are shown. Finally in Figure 5, the calculated velocity vectors on the leeward side projected normal to the streamwise direction are shown. The separated flow region on the leeward side is clearly shown by this figure.

The above results were obtained by evaluating $\partial p / \partial x$ explicitly. Runs were also made with $\partial p / \partial x = 0$ and the results differed very slightly from those presented.

A comparison of actual convergence and stability restrictions with the analytical restrictions for this case is presented in Figure 6. From Eq. (24) with $\Delta\Phi = 10$ deg and taking 1 as a lower bound for $|u/w|$ we see that

$$\frac{\Delta x}{x} < 0.03 \quad (29)$$

is necessary for convergence. Equation (28) implies that the biggest restriction occurs for small u , that is near to the cone. To simplify the expression, suppose that $\cos m_1 \Delta\Phi$ and $\cos m_2 \Delta y$ are zero. This is not strictly valid; however, we are looking for an approximate answer. Making this assumption may not give us precise quantitative results but hopefully qualitative results will be obtained. For the cases run, $\Delta y \ll r \Delta\Phi$. The nearest point to the cone that is solved for corresponds to $y = \Delta y$. The functions p and μ evaluated at Δy are approximately constant as functions of x . Also it

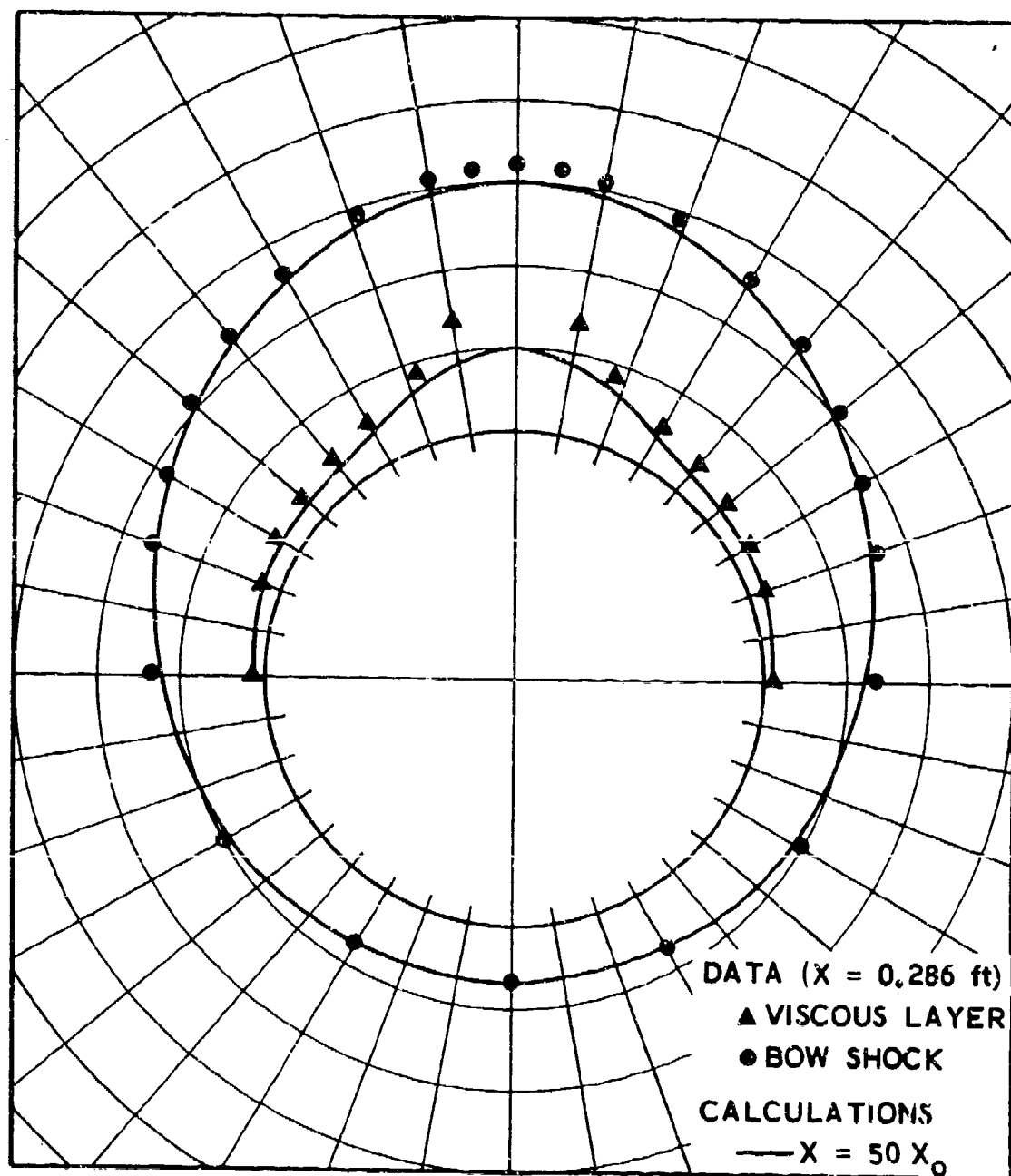


Figure 2. Geometry of the Flow for Tracy's Cascade, $\alpha = 12$ deg

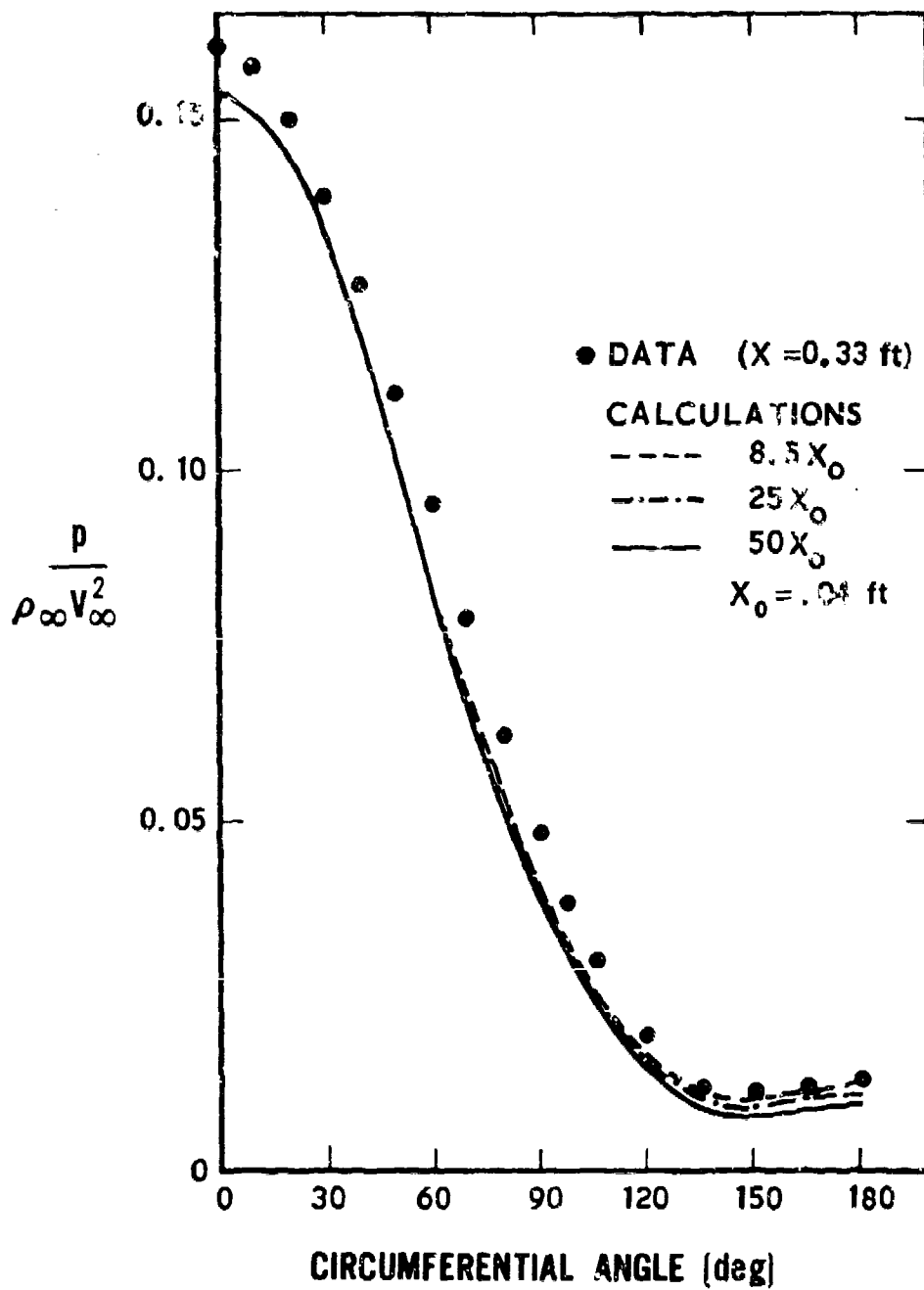


Figure 3. Circumferential Surface Pressure Distribution for Tracy's Case, $\alpha = 12$ deg

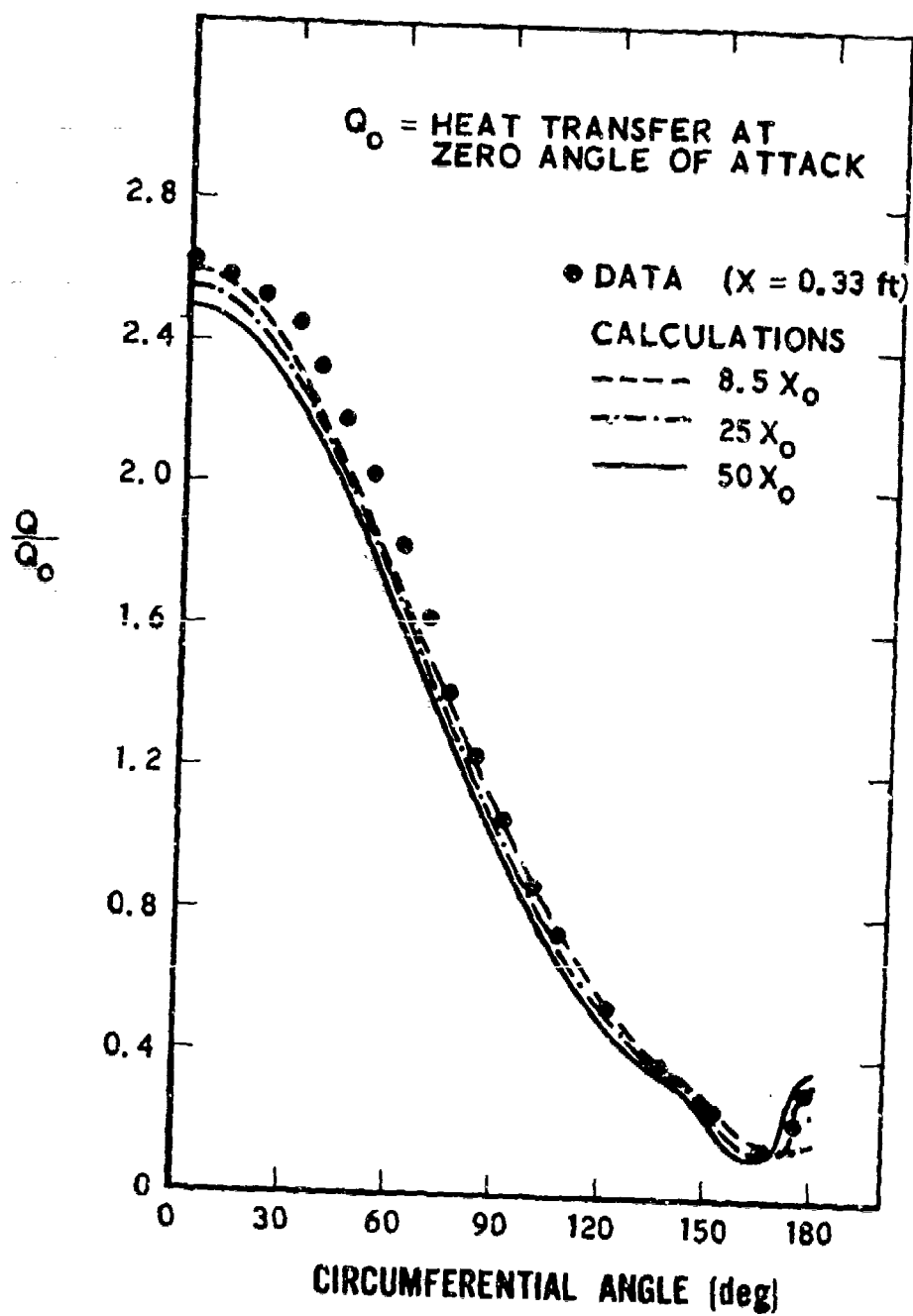


Figure 4. Circumferential Heat Transfer Distribution for Tracy's Case, $\alpha = 12$ deg

CALCULATED RESULTS

$$X = 50 x_0$$

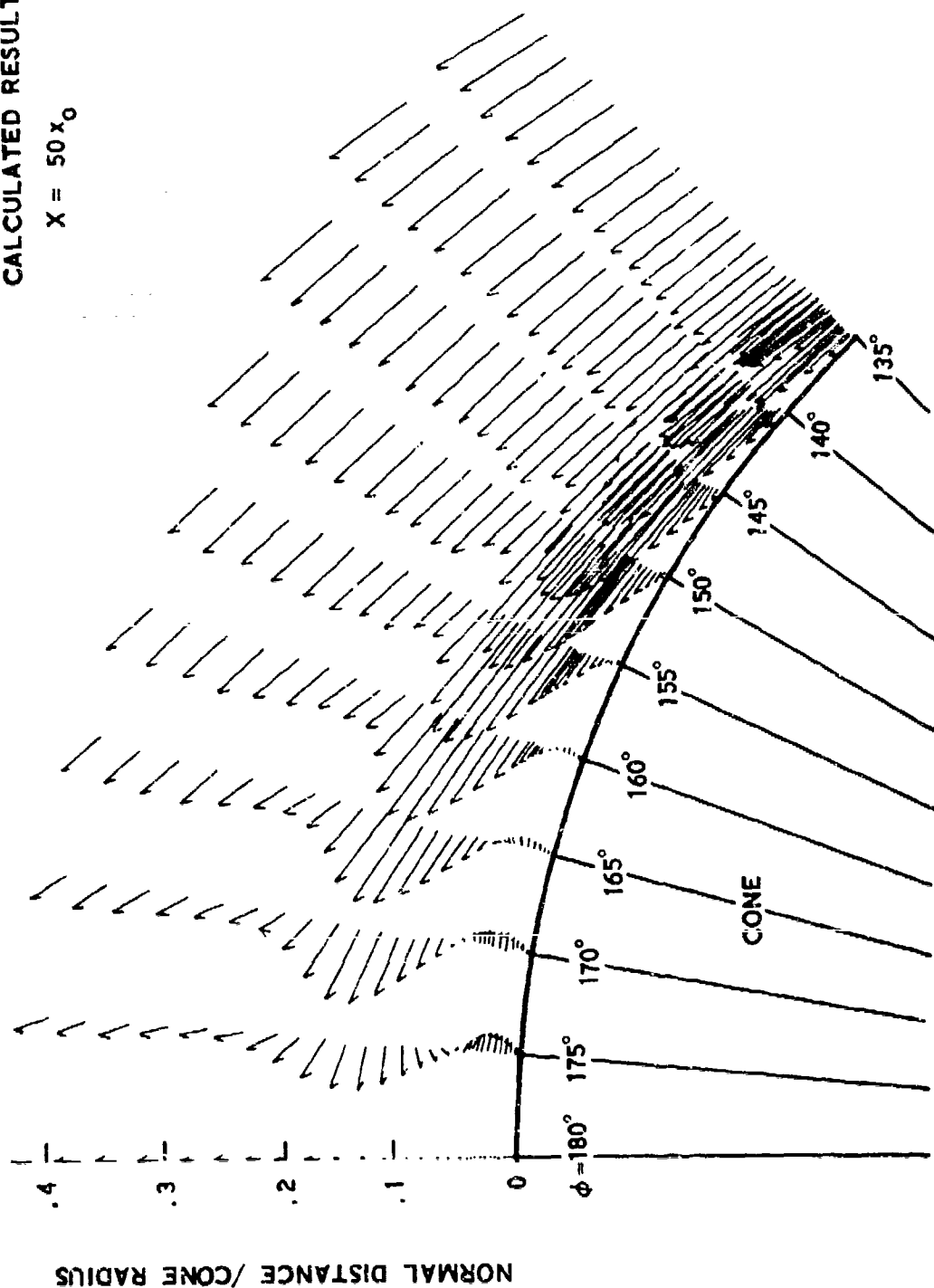


Figure 5. $y - \phi$ Velocity Vector Distribution for Tracy's Case, $\alpha = 12$ deg

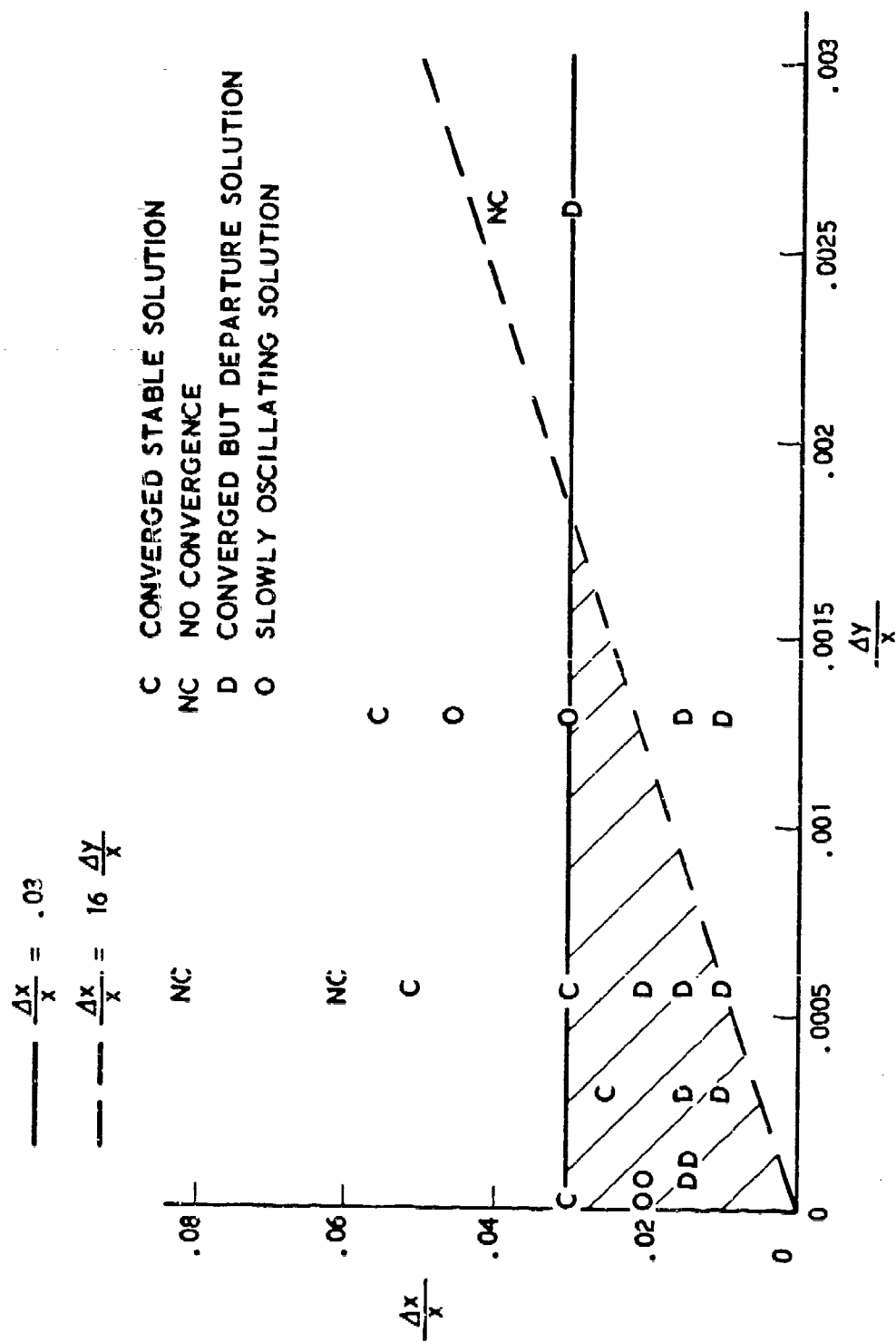


Figure 6. Comparison of Analytical and Numerical Results

has been observed that the ratio $\Delta y/u$ where u is evaluated at $y = \Delta y$ is almost constant as a function of x . Thus Eq. (28) is approximately

$$\frac{\Delta x}{x} = \left[\frac{Re_p}{2\mu} \frac{\Delta y}{x} \right] \frac{\Delta y}{x} \quad (30)$$

where the expression in brackets in Eq. (30) is approximately constant. In addition, since the transformation $y = \eta\xi$ is made, $\Delta y = \Delta\eta\xi$; and since ξ increases approximately linearly with x , then $\Delta y/x$ remains constant as x increases. Equation (30) then implies that for an initially chosen Δy , Δx must increase linearly as x increases. Therefore if Δy is chosen so that Eqs. (30), (29) are satisfied initially, they will be satisfied for all x provided Δx increases proportionally to x .

Tracy's case was run with $\Delta x/x = 0.03$ and a $\Delta\eta$ spacing such that initially $\Delta y/x = 0.0006$. The expression in brackets in Eq. (30) is equal to 16 so that Eq. (30) is satisfied. With $\Delta\Phi = 10$ several different values for Δx and Δy were used to determine how accurate the derived inequalities are. The results are shown in Figure 6. The shaded region is the predicted area where convergent stable solutions should be obtained. The actual region of convergent stable solutions is somewhat different. However, the qualitative results are correct. It was found that increasing Δx slowed down the convergence of the iterative procedure to obtain the solution at an x station until finally it did not converge. Decreasing Δx sped up the convergence but produced solutions that departed as a function of x . Increasing Δy led to departure solution and decreasing Δy led to stable solutions. For a few cases the results for the surface pressure on the leeward side (the most critical for departure) at $\alpha = 12$ deg are shown in Figure 7.

A second case has been run to compare with experimental data obtained by Stetson and Ojdana (Ref. 9) on a sharp 5.6 deg half angle cone at an angle of attack of 8 deg. The parameters used in the calculation are given in Table II. Figure 8 shows the wall pressure distribution on the leeward side at $\bar{x} = 17$. Stetson's case was run with $\partial p/\partial x = 0$. Analysis of the restrictions

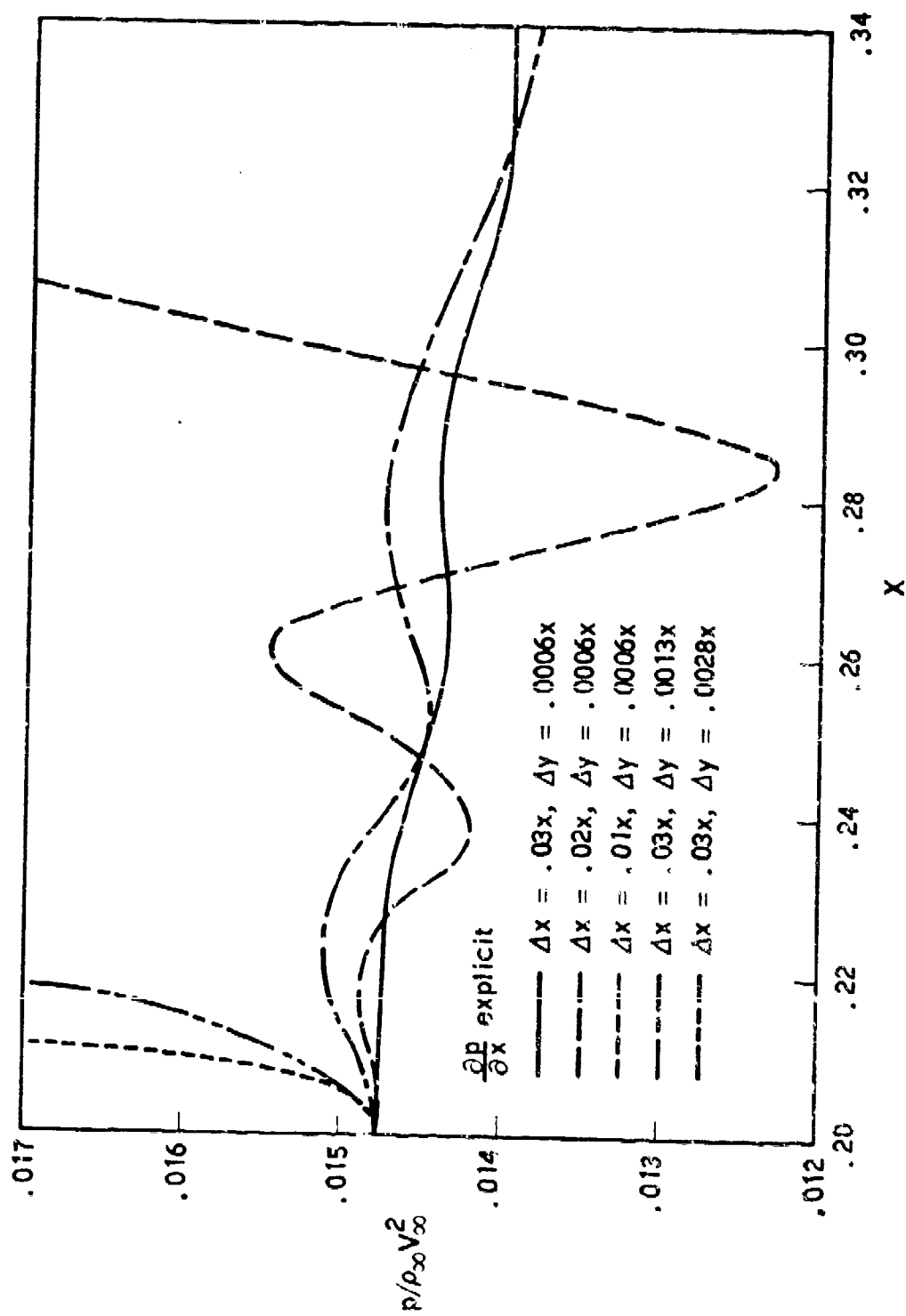


Figure 7. Leeward Surface Pressure for Different Values of Δx and Δy

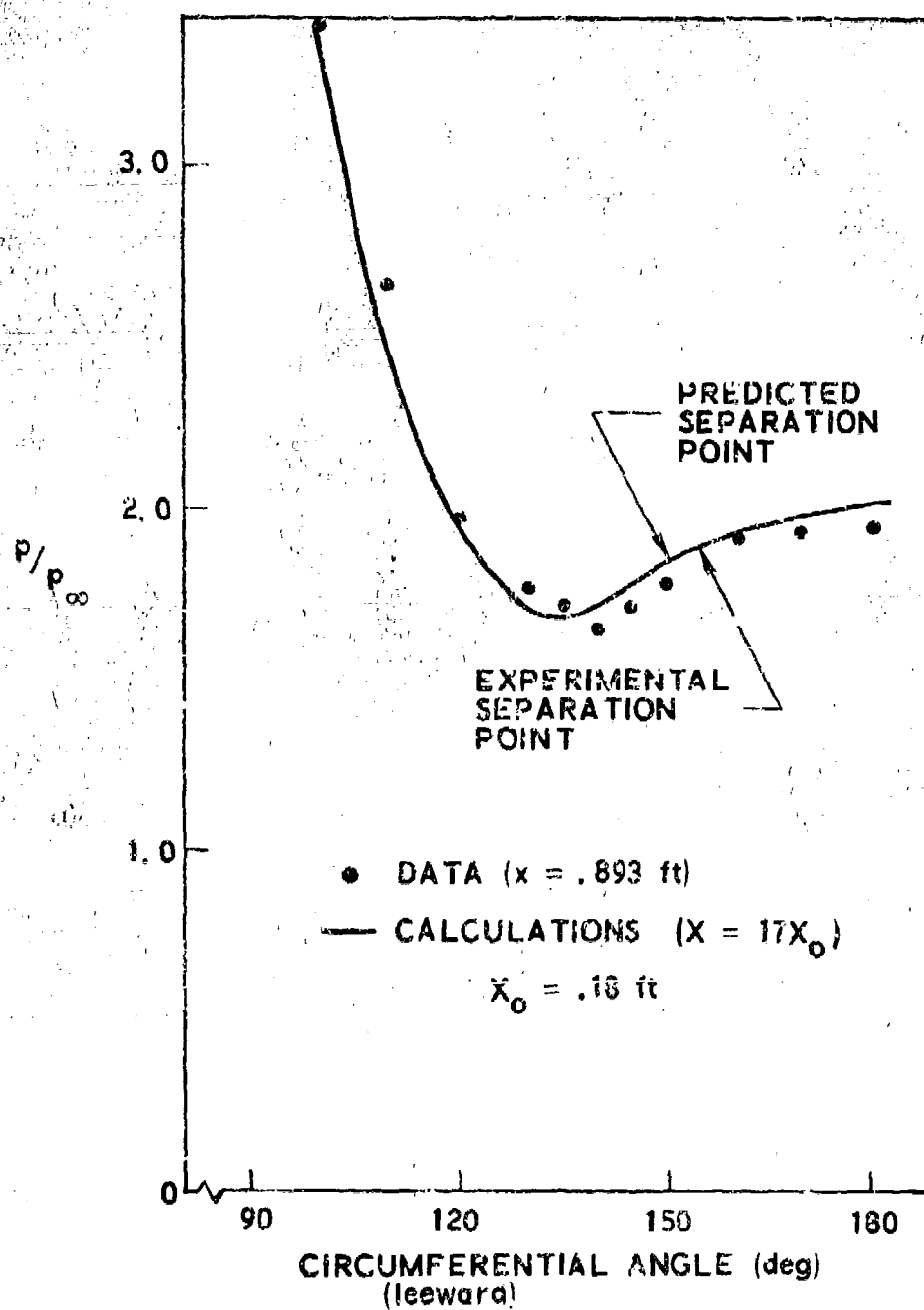


Figure 8. Circumferential Surface Pressure Distribution for Stetson's Case, $\alpha = 8$ deg

on Δx for $\partial p / \partial x$ evaluated explicitly as was done for Tracy's case led to Δx spacings that were much too small in the sense that too many y mesh points were required and the storage capability of the computer was exceeded. Numerical experimentation verified that the solution could not be obtained for any permissible mesh spacing when $\partial p / \partial x$ was evaluated explicitly.

Table II. Parameters for Stetson's Case

Parameter	Symbol and Value
cone half angle	$\theta = 5.6 \text{ deg}$
angle of attack	$\alpha = 8 \text{ deg}$
freestream Mach number	$M_{\infty} = 14.2$
freestream Reynolds number	$Re = 0.83 \times 10^6 / \text{ft}$
freestream Prandtl number	$Pr = 0.75$
ratio of specific heats	$\gamma = 1.4$
Sutherland constant	$S = 4$
freestream dimensionless pressure	$p_{\infty} = 0.00354$
static enthalpy at the cone	$h_w = 32.398$

SECTION V

COMPUTER PROGRAM

A computer program has been developed for the CDC/7600 computer that solves the above equations. Provision has been made for variable grid sizes in both the y and Φ directions and this feature has been used heavily. The iteration logic has been structured so that when the solution along a Φ line converges to the desired number of figures, that line is dropped from the iteration loop. This saves considerable time since a few Φ lines require as many as seven iterations to converge to five figures while most Φ lines require only two or three iterations.

For 50 points in the y direction and 23 points in the Φ direction the program requires 35,000 words of storage. It takes 30 sec to obtain the solution accurate to five figures at one x station. Eleven percent of this time is spent evaluating all the derivative expressions, 33 percent is spent computing the Jacobian coefficient matrix, and 56 percent is spent solving the linear equations. For Tracy's case it took about 120 steps to go from $\bar{x} = 1$ to $\bar{x} = 50$.

For convenience in programming the derivatives were defined as

$$\frac{\partial u^n}{\partial \Phi} = \left(u_{j+1, k, l+1}^n - u_{j+1, k, l-1}^{n+1} \right) / 2\Delta\Phi$$

$$\frac{\partial^2 u^n}{\partial \Phi^2} = \left(u_{j+1, k, l+1}^n - 2u_{j, k, l}^{n+1} + u_{j, k, l-1}^{n+1} \right) / \Delta\Phi^2$$

The right hand side of Eq. (4) became

$$- \frac{\partial u^n}{\partial x} - a \frac{\partial u^n}{\partial \eta} - b \frac{\partial u^n}{\partial \Phi} + c \frac{\partial^2 u^n}{\partial \eta^2} + d \frac{\partial^2 u^n}{\partial \Phi^2}$$

Preceding page blank

where the underlined terms in Eq. (4) have been ignored. It is seen that it is necessary to store only two planes of the solution, one at j and one for the current iterate at $j+1$. The $n+1$ iterate is stored on top of the n iterate as it is computed.

SECTION VI

DISCUSSION AND CONCLUSIONS

A method for solving the implicit difference equations describing the three-dimensional flow around a cone at angle of attack has been described and analyzed. These equations which are derived and discussed in Ref. 6 constitute a system of three-dimensional nonlinear parabolic equations. The technique for solving these equations has been shown to be accurate and efficient in both running time and computer storage.

The numerical method is not restricted to steady flow problems but could easily be applied to two-dimensional time dependent calculations.

An analysis of the numerical aspect of departure solutions has been presented. Methods that have been proposed by other authors to suppress the departure solutions have been verified and in some cases qualified. In addition, it has been shown that departure solutions can be suppressed even if the streamwise pressure derivative is included, if the stepsize is large enough.

Results have been compared with experimental data and the agreement is very good.

REFERENCES

1. E. C. DuFort and S. P. Frankel, "Stability Conditions in the Numerical Treatment of Parabolic Differential Equations," Journal Math. Tables and Other Aids to Computation, Vol. 7, (1953), pp. 135-152.
2. Luigi Crocco, "A Suggestion for the Numerical Solution of the Steady Navier-Stokes Equations," AIAA Journal, Vol. 3, No. 10, October 1965, pp. 1824-1832.
3. Jim Douglas, Jr. and James E. Gunn, "A General Formulation of Alternating Direction Methods," Journal Numerische Mathematik 6, (1964), pp. 428-453.
4. Stanley G. Rubin and Tony C. Lin, "A Numerical Method for Three Dimensional Viscous Flow: Application to the Hypersonic Leading Edge," Journal of Computational Physics, Vol. 9, No. 2, April 1972, pp. 339-364.
5. L. Fox, Numerical Solution of Ordinary and Partial Differential Equations, Pergamon Press Ltd., London (1962).
6. Stephen C. Lubard and William S. Helliwell, Calculation of Separation on a Cone at Angle of Attack, (to be published).
7. T. C. Lin and S. G. Rubin, Viscous Flow Over a Cone at Moderate Incidence, Polytechnic Institute of Brooklyn, Brooklyn, New York, (1972) (to be published).
8. Richard R. Tracy, Hypersonic Flow Over a Yawed Circular Cone, Ph.D. Thesis, California Institute of Technology, Graduate Aeronautical Labs, Firestone Flight Sciences Lab., Pasadena, California, August 1963.
9. Kenneth F. Stetson and E. S. Ojdana, "Hypersonic Laminar Boundary-Layer Separation on a Slender Cone at Angle of Attack," Paper presented AIAA Ninth Aerospace Sciences Meeting, Paper No. 71-129, January 1971.
10. Eugene Isaacson and Herbert Bishop Keller, Analysis of Numerical Methods, John Wiley and Sons, Inc., New York (1966).
11. Robert D. Richtmyer and K. W. Morton, Difference Methods for Initial Value Problems, Second Edition, Interscience Publishers (1967).

REFERENCES (Continued)

12. Eric Baum and M. Richard Denison, "Interacting Supersonic Laminar Wake Calculations by a Finite Difference Method," AIAA Journal, Vol. 5, No. 7, July 1967, pp. 1224-1230.
13. John T. Ohrenberger and Eric Baum, "A Theoretical Model of the Near Wake of a Slender Body in Supersonic Flow," AIAA Third Fluid and Plasma Dynamics Conference, Paper No. 70-792, June 1970.
14. S. G. Rubin and T. C. Lin, Numerical Methods for Two- and Three-Dimensional Viscous Flow Problems; Application to Hypersonic Leading Edge Equations, PIBAL Report No. 71-8, Polytechnic Institute of Brooklyn, Brooklyn, New York, April, 1971.
15. C. F. Curtiss and J. O. Hirschfelder, "Integration of Stiff Equations," Proceedings of the National Academy of Sciences, Vol. 38, No. 3 (1952), pp. 235-243.
16. Thomas J. Tyson, Laminar Boundary Layers in the Neighborhood of Abrupt Spatial Disturbances, Ph. D. Thesis, California Institute of Technology, Graduate Aeronautical Labs, Pasadena, California, June 1967.

APPENDIX A

PROGRAM INPUT INSTRUCTIONS

The input is divided into two sections, namelist input and formatted input. Parameters describing the problem are read using NAMELIST/INPUT/.

GAMMA = γ
 MINF = M_{∞}
 THETAC = θ
 REINF = Re
 PRINF = Pr
 ALFA = α
 PINF = p_{∞}
 SPROP = S
 NJ = number of x-stations
 NK = number of y-stations at which initial conditions are specified
 NL = number of ϕ -stations at which initial conditions are specified
 MOD = .TRUE. or .FALSE.
 depending on whether the input mesh distribution is to be modified or not. Default is .FALSE.
 ITAPE = 0, no output on TAPE2, this is the default
 = N, output solution on TAPE2 every Nth x-step

The rest of the input is read using format control.

IREAD (I12)

IREAD > 0 read initial profile from TAPE3, used for restart purposes. The first profile on TAPE 3 at an x station bigger than or equal to X(1) is selected as the initial profile.

IREAD \leq 0 read initial profile from cards

If IREAD ≤ 0 then the cards with the solution are input

repeat
NL times { FI(L), ZI(1, L) (2E12.5)
 FI(L) is a Φ station in degrees
 ZI(1, L) is the shock distance at Φ
 ET(K), U(K, L), V(K, L), W(K, L), P(K, L), H(K, L), K=1, NK(6E12.5)
 ET(K) is a distance from the body (=y not y/shock)
 U, V, W, P, H are values of u, v, w, p, h at ET(K), FI(L)

X(J) J=1 or J=1, NJ (6E12.5)

X(J) is an X-station along the body. If J=1 then the rest of the points are obtained using $X(J+1) = c * X(J)$ where c is a constant > 1 . X(1) is the position of the initial profile.

The following cards describe v and h at the body:

L (112)

L is the index of a Φ station

J, VB(J, L), HB(J, L) (112, 2E12.5)

J is the index of an X station

VB(J, L) is the value of v at the body at X(J), FI(L)

HB(J, L) is the value of h at the body at X(J), FI(L)

This card is repeated with N increasing from 1 to NJ.

If any J stations are skipped then linear interpolation is used to obtain VB and HB at the skipped stations

There then follows a card with another L value and cards with J, VB, and HB. These groups are repeated with L increasing from 1 to NL. If any L stations are skipped then linear interpolation is used to obtain VB and HB at the skipped stations.

If MOD=.TRUE. more cards are needed.

NEWK, NEWL (215)

NEWK is a new value for NK, and indicates that the input η distribution is to be changed. If the η distribution is not to be changed then leave NEWK blank.

NEWL as with NEWK but for NL and Φ .

If NEWK > 0

ETNEW(K) K=1, NEWK (6D12.4).

The numbers must increase from 0. The input numbers are scaled by the program to go from 0. to 1. by dividing by ETNEW (NEWK)

If NEWL > 0

FINEW(L) L=1, NEWL (6D12.4)

These are the new Φ stations in degrees. They must increase from 0 to 180 deg.

APPENDIX B

PROGRAM OUTPUT

The namelist input is printed out. If the initial profiles were read from cards then the card images are printed.

The x-stations at which the solution will be obtained are printed.

The input profiles are printed and if the mesh distribution was changed, then the new initial profiles are printed.

The profiles are printed at each x-station as they are obtained. Preceding each station printout is printed the iteration and convergence history for that x-station. The variables printed are ITER and INS(L), L=1, NL. If all Φ -rays have converged then ITER=0, otherwise ITER=1. If the Lth Φ -ray has converged then INS(L) = 0, otherwise INS(L) = 1.

The parameters read in with namelist are written on TAPE4, followed by the profiles at each x-station. The data are written without format control and can be used to supply initial conditions.

If ITAPE > 0 then the profiles are written on TAPE2 at each ITAPEth x-station. TAPE2 can be set up as the punch file.

APPENDIX C

EXAMPLE PROBLEM

The input necessary to run Tracy's case (see Table I) is given in Appendix D. The sequence numbers on the initial condition profiles are not required, they are included on the sample deck to aid in ordering the cards if they get mixed up.

The output from the program is presented in Appendix E. The solution has been printed at only a few mesh points.

After running much further along the cone the solution profiles obtained would be similar to those shown in Figures C-1, C-2, C-3, C-4, and C-5.

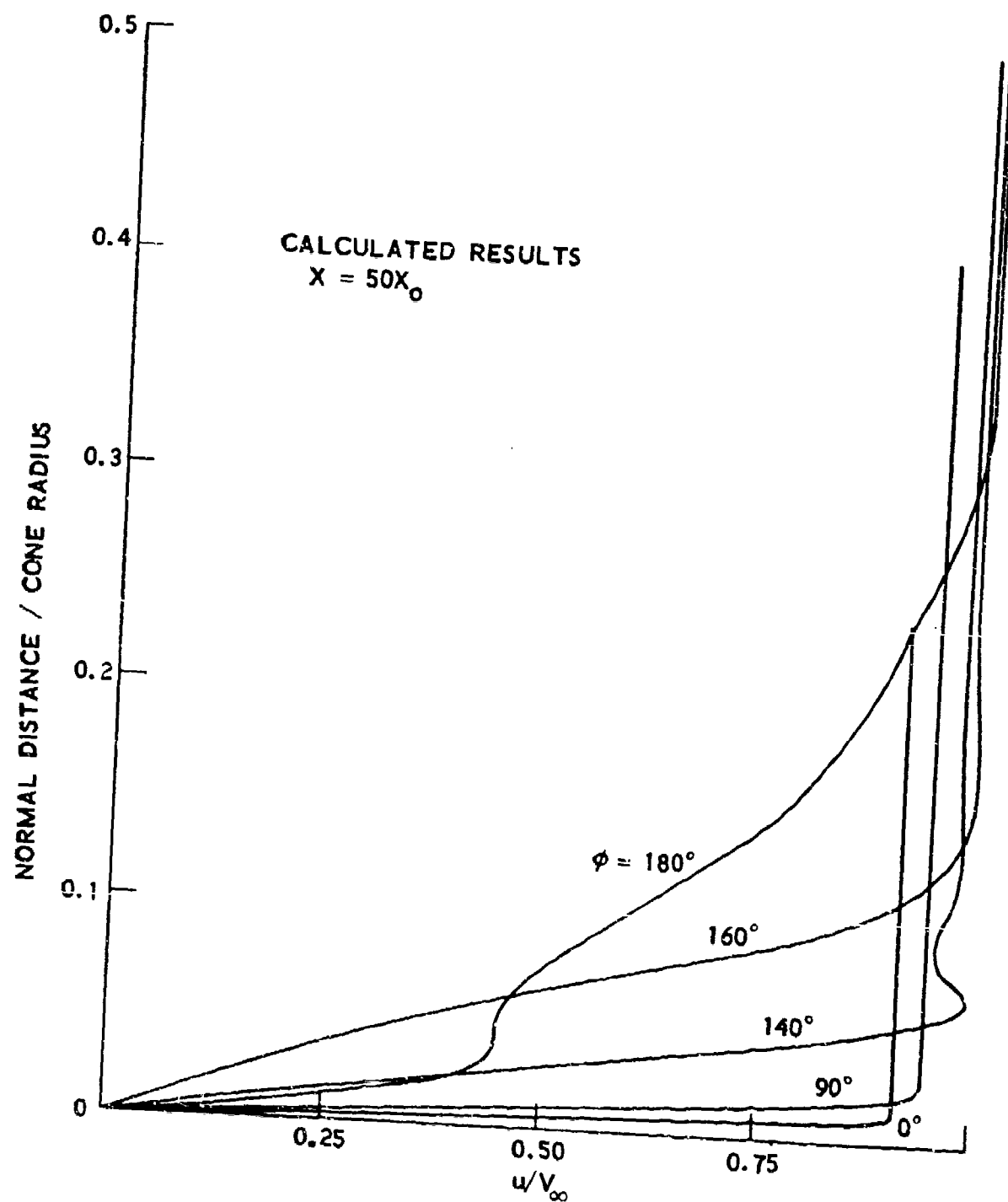


Figure C-1. Streamwise Velocity Profiles for Tracy's Case, $\alpha = 12^\circ$

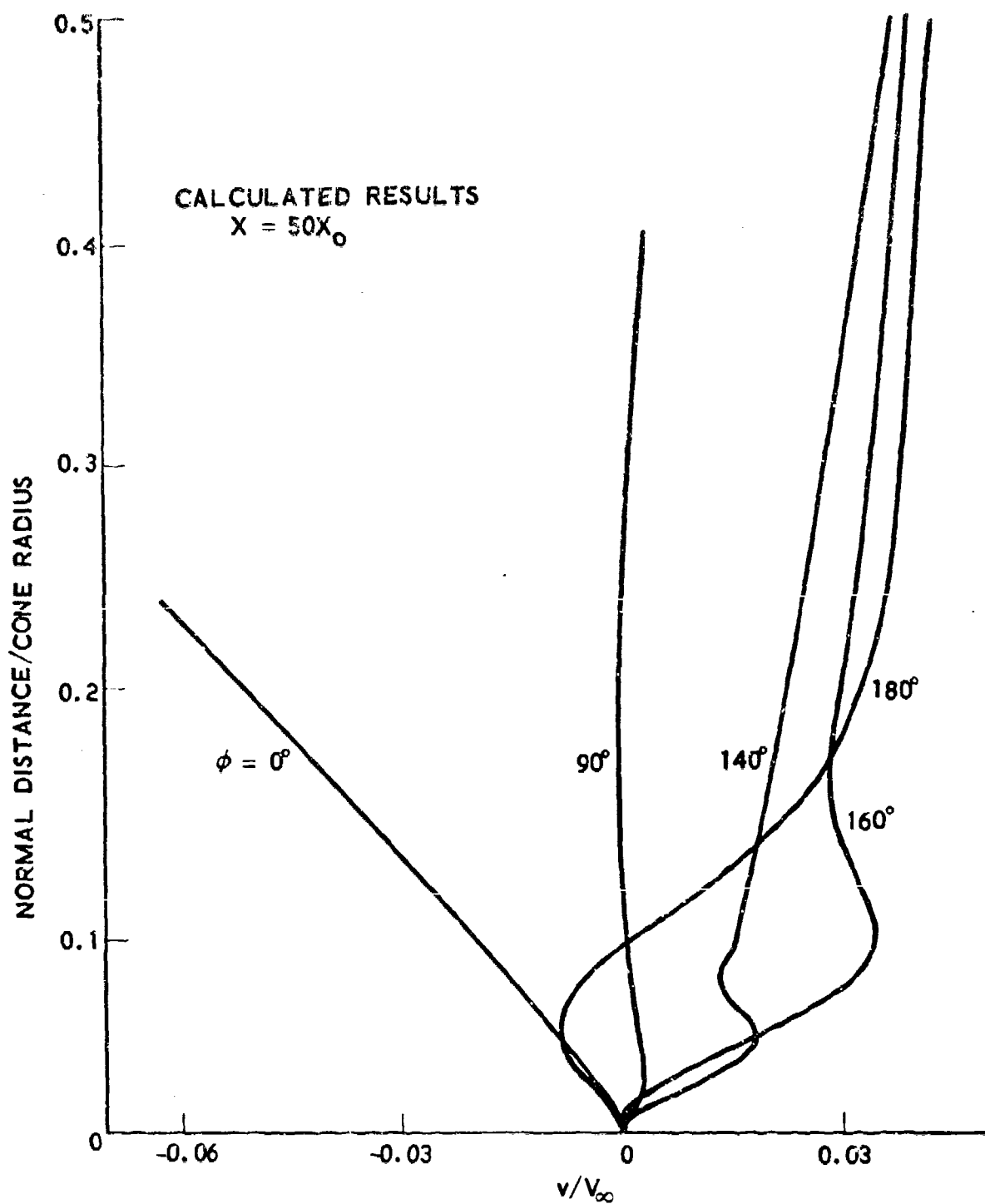


Figure C-2. Normal Velocity Profiles for Tracy's Case, $\alpha = 12^\circ$

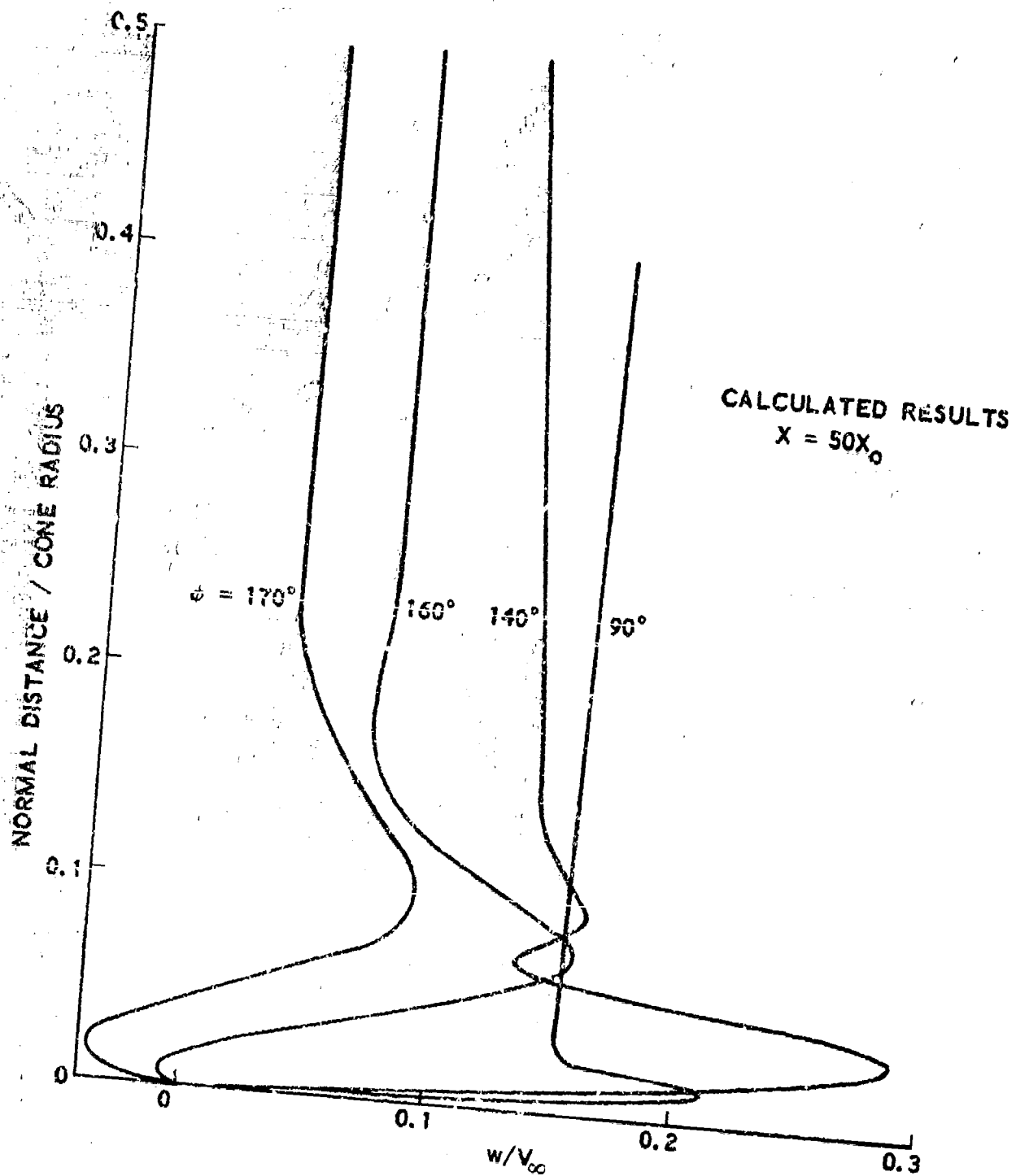


Figure C-3. Circumferential Velocity Profiles for
 Tracy's Case, $\alpha = 12^\circ$

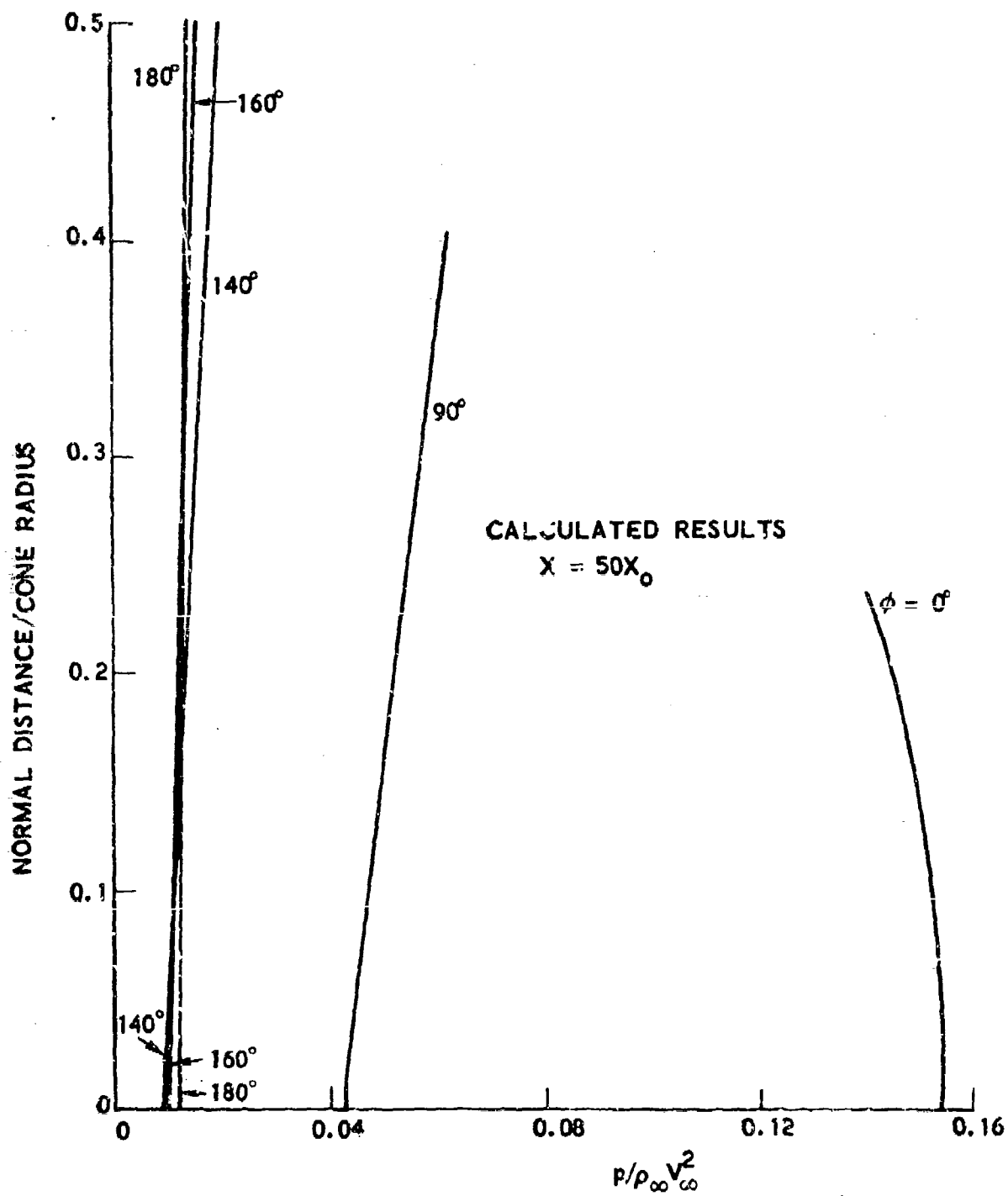


Figure C-4. Pressure Profiles for Tracy's Case.
 $\alpha = 12$ deg

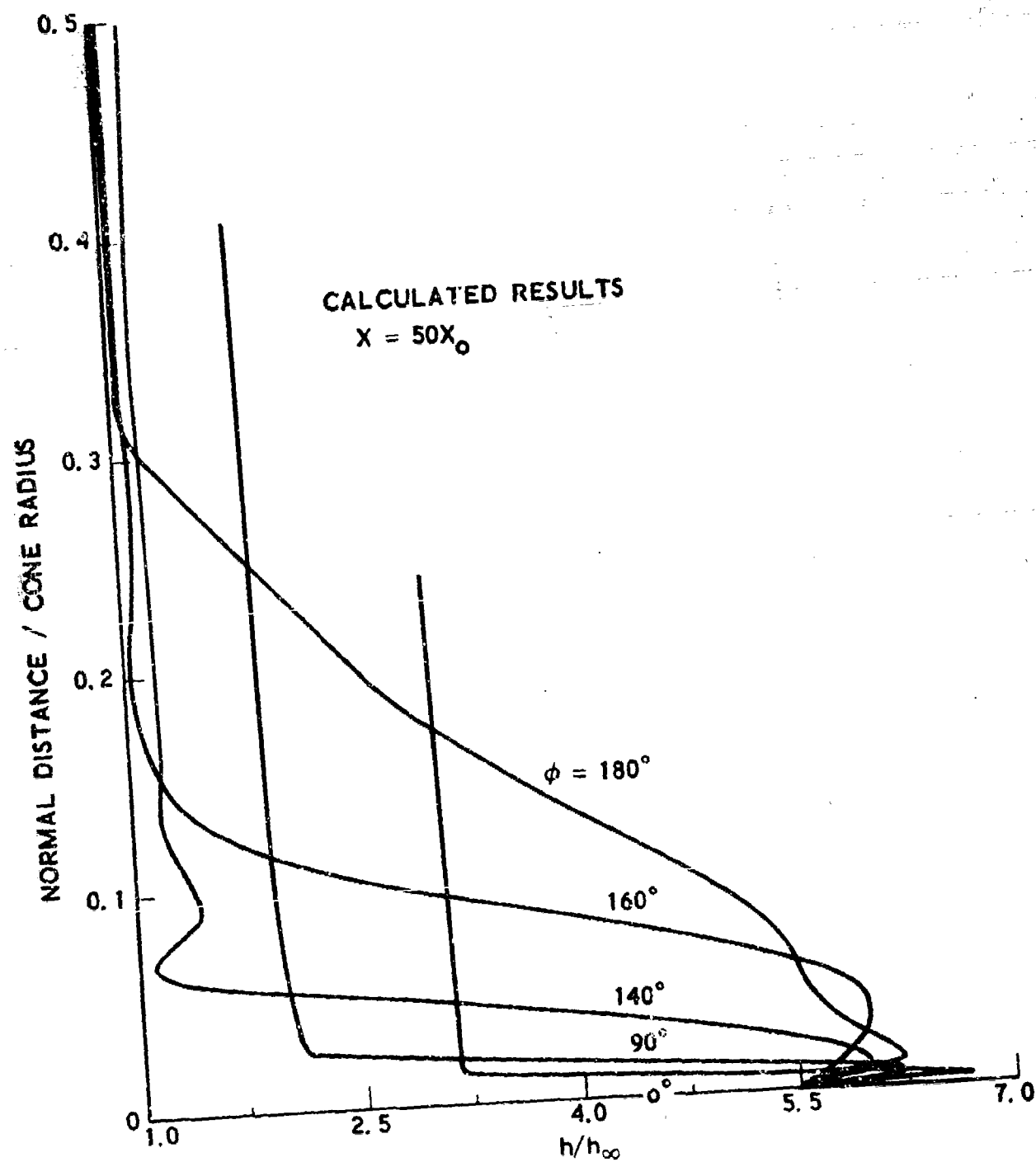


Figure C-5. Enthalpy Profiles for Tracy's Case.
 $\alpha = 12 \text{ deg}$

APPENDIX D
INPUT FOR TRACY'S CASE

.13229E-02	.93444E+00	-.62657E-01	.16522E-68	.13055E+00	.25729E+01	00360
.13895E-02	.93309E+00	-.66718E-01	.11826E-68	.12918E+00	.25986E+01	00390
.14494E-02	.93189E+00	-.70331E-01	.84876E-69	.12794E+00	.26208E+01	00400
.15023E-02	.93085E+00	-.73578E-01	.60151E-69	.12672E+00	.26396E+01	00410
.15502E-02	.92994E+00	-.76472E-01	.41966E-69	.12562E+00	.26558E+01	00420
.15929E-02	.92915E+00	-.79099E-01	.28880E-69	.12453E+00	.26693E+01	00430
.16322E-02	.92846E+00	-.81465E-01	.19453E-69	.12356E+00	.26810E+01	00440
.16681E-02	.92785E+00	-.83679E-01	.12940E-69	.12256E+00	.26906E+01	00450
.17006E-02	.92734E+00	-.85610E-01	.87013E-70	.12172E+00	.26986E+01	00460
.17297E-02	.92692E+00	-.87420E-01	.60146E-70	.12082E+00	.27047E+01	00470
.17560E-02	.92656E+00	-.88942E-01	.43429E-70	.12015E+00	.27096E+01	00480
.17799E-02	.92628E+00	-.90485E-01	.30048E-70	.11930E+00	.27129E+01	00490
.18021E-02	.92604E+00	-.91654E-01	.19667E-70	.11884E+00	.27157E+01	00500
.18226E-02	.92586E+00	-.93178E-01	0.	.11781E+00	.27164E+01	00510
.18368E-02	0.	0.	0.	.13688E+00	.55093E+01	00520
.68899E-05	.16426E-01	-.10222E-04	.10524E-02	.13686E+00	.56197E+01	00530
.1469E-04	.34203E-01	-.44706E-04	.21539E-02	.13684E+00	.57333E+01	00540
.2277E-04	.53280E-01	-.10813E-03	.12924E-02	.13682E+00	.58484E+01	00560
.31866E-04	.74002E-01	-.20919E-03	.44769E-02	.13680E+00	.59655E+01	00570
.42028E-04	.96691E-01	-.35713E-03	.57108E-02	.13678E+00	.60841E+01	00580
.53224E-04	.12128E+00	-.56211E-03	.69727E-02	.13675E+00	.62014E+01	00590
.65454E-04	.14770E+00	-.83248E-03	.82409E-02	.13673E+00	.63143E+01	00600
.7217E-04	.16205E+00	-.10304E-02	.88914E-02	.13671E+00	.63700E+01	00610
.78889E-04	.17528E+00	-.11817E-02	.95101E-02	.13670E+00	.64212E+01	00620
.86796E-04	.19185E+00	-.13962E-02	.10156E-01	.13668E+00	.64726E+01	00630
.93702E-04	.20733E+00	-.16256E-02	.10766E-01	.13667E+00	.65190E+01	00640
.11007E-03	.24103E+00	-.21313E-02	.11989E-01	.13664E+00	.66036E+01	00650
.12815E-03	.27774E+00	-.28680E-02	.13152E-01	.13662E+00	.66700E+01	00660
.14813E-03	.31768E+00	-.37009E-02	.14222E-01	.13658E+00	.67115E+01	00670
.17018E-03	.36104E+00	-.47000E-02	.15159E-01	.13657E+00	.67200E+01	00680
.19447E-03	.40799E+00	-.58728E-02	.15917E-01	.13655E+00	.68859E+01	00690
.22117E-03	.45862E+00	-.72316E-02	.16446E-01	.13655E+00	.69799E+01	00700
.25214E-03	.51617E+00	-.88624E-02	.16698E-01	.13655E+00	.64316E+01	00710
.28662E-03	.57792E+00	-.10673E-01	.16577E-01	.13658E+00	.61751E+01	00720
.32451E-03	.64313E+00	-.12612E-01	.16030E-01	.13662E+00	.58108E+01	00730
.36620E-03	.71054E+00	-.14604E-01	.15033E-01	.13669E+00	.53280E+01	00740
.41167E-03	.77740E+00	-.16499E-01	.13632E-01	.13677E+00	.47320E+01	00750
.46162E-03	.84033E+00	-.18211E-01	.11958E-01	.13688E+00	.40455E+01	00760
.51657E-03	.89348E+00	-.19711E-01	.10321E-01	.13694E+00	.33394E+01	00770
.57703E-03	.92998E+00	-.21331E-01	.92336E-02	.13695E+00	.27410E+01	00780
.64351E-03	.94675E+00	-.23602E-01	.92104E-02	.13684E+00	.23810E+01	00790
.71259E-03	.94880E+00	-.26573E-01	.10312E-01	.13658E+00	.22843E+01	00800
.78166E-03	.94638E+00	-.30136E-01	.11940E-01	.13611E+00	.23153E+01	00810

.85073E-03	.94463E+00	-.34039E-01	.13555E-01	.13555E+00	.23567E+01	00820
.91980E-03	.94324E+00	-.37907E-01	.15080E-01	.13496E+00	.23886E+01	00830
.98870E-03	.94180E+00	-.41856E-01	.16551E-01	.13408E+00	.24185E+01	00840
.10576E-02	.94043E+00	-.45802E-01	.17968E-01	.13321E+00	.24473E+01	00850
.11265E-02	.93906E+00	-.49822E-01	.19346E-01	.13224E+00	.24751E+01	00860
.11954E-02	.93767E+00	-.53828E-01	.20691E-01	.13120E+00	.25026E+01	00870
.12643E-02	.93628E+00	-.57901E-01	.22011E-01	.13004E+00	.25296E+01	00880
.13332E-02	.93489E+00	-.61951E-01	.23304E-01	.12883E+00	.25561E+01	00890
.14004E-02	.93354E+00	-.65963E-01	.24545E-01	.12751E+00	.25812E+01	00900
.14607E-02	.93234E+00	-.69529E-01	.25634E-01	.12631E+00	.26030E+01	00910
.15141E-02	.93130E+00	-.72734E-01	.26579E-01	.12513E+00	.26214E+01	00920
.15623E-02	.93039E+00	-.75589E-01	.27408E-01	.12407E+00	.26372E+01	00930
.16053E-02	.92960E+00	-.78181E-01	.28126E-01	.12301E+00	.26504E+01	00940
.16450E-02	.92890E+00	-.80513E-01	.28758E-01	.12207E+00	.26618E+01	00950
.16811E-02	.92829E+00	-.82699E-01	.29305E-01	.12110E+00	.26712E+01	00960
.17139E-02	.92778E+00	-.84602E-01	.29765E-01	.12029E+00	.26790E+01	00970
.17431E-02	.92735E+00	-.86389E-01	.30144E-01	.11941E+00	.26850E+01	00980
.17697E-02	.92700E+00	-.87888E-01	.30448E-01	.11876E+00	.26897E+01	00990
.17938E-02	.92671E+00	-.89415E-01	.30692E-01	.11793E+00	.26929E+01	01000
.18162E-02	.92644E+00	-.90564E-01	.30875E-01	.11749E+00	.26956E+01	01010
.18368E-02	.92630E+00	-.92077E-01	.31014E-01	.11647E+00	.26961E+01	01020
.20000E+02	.18783E-02	0.	0.	.13093E+00	.55093E+01	01030
.70454E-05	.16254E-01	-.96149E-05	.20460E-02	.13041E+00	.56181E+01	01040
.14795E-04	.33847E-01	-.42100E-04	.41882E-02	.11909E+00	.57301E+01	01050
.23250E-04	.52730E-01	-.10189E-03	.64024E-02	.13088E+00	.58435E+01	01060
.32585E-04	.73246E-01	-.19726E-03	.87066E-02	.13086E+00	.59389E+01	01080
.42977E-04	.95713E-01	-.33698E-03	.11107E-01	.13084E+00	.60759E+01	01090
.54425E-04	.12006E+00	-.53078E-03	.13563E-01	.13081E+00	.61915E+01	01100
.66931E-04	.14624E+00	-.78666E-03	.16032E-01	.13079E+00	.63028E+01	01110
.73800E-04	.16045E+00	-.94574E-03	.17298E-01	.13078E+00	.63577E+01	01120
.80670E-04	.17455E+00	-.11175E-02	.18503E-01	.13077E+00	.64082E+01	01130
.88243E-04	.18598E+00	-.13210E-02	.19761E-01	.13075E+00	.64590E+01	01140
.95817E-04	.20528E+00	-.15387E-02	.20950E-01	.13074E+00	.65048E+01	01150
.11255E-03	.23872E+00	-.20667E-02	.23332E-01	.13071E+00	.65885E+01	01160
.13104E-03	.27511E+00	-.27201E-02	.25599E-01	.13069E+00	.66543E+01	01170
.15148E-03	.31470E+00	-.35141E-02	.27688E-01	.13066E+00	.66959E+01	01180
.17402E-03	.35771E+00	-.44685E-02	.29520E-01	.13065E+00	.67054E+01	01190
.19826E-03	.40429E+00	-.55917E-02	.31006E-01	.13064E+00	.66731E+01	01200
.22616E-03	.45456E+00	-.68966E-02	.32051E-01	.13063E+00	.65883E+01	01210
.25804E-03	.51194E+00	-.84684E-02	.32564E-01	.13065E+00	.64268E+01	01220
.29309E-03	.57317E+00	-.10221E-01	.32355E-01	.13069E+00	.61768E+01	01230
.33184E-03	.63816E+00	-.12108E-01	.31323E-01	.13073E+00	.58204E+01	01240
.37446E-03	.70553E+00	-.14060E-01	.29420E-01	.13081E+00	.53462E+01	01250

.42094E-03	.77267E+00	-.15931E-01	.26722E-01	.13089E+00	.47578E+01	01260
.47204E-03	.83636E+00	-.17630E-01	.23469E-01	.13100E+00	.40745E+01	01270
.52823E-03	.89085E+00	-.19110E-01	.20239E-01	.13109E+00	.33625E+01	01280
.59005E-03	.92909E+00	-.20666E-01	.18015E-01	.13112E+00	.27470E+01	01290
.65804E-03	.94738E+00	-.22834E-01	.17839E-01	.13103E+00	.23642E+01	01300
.72867E-03	.95010E+00	-.25679E-01	.19917E-01	.13083E+00	.22516E+01	01310
.79930E-03	.94773E+00	-.29100E-01	.23133E-01	.13041E+00	.22781E+01	01320
.86991E-03	.94547E+00	-.32389E-01	.26367E-01	.12991E+00	.23189E+01	01330
.94056E-03	.94455E+00	-.36635E-01	.29422E-01	.12550E+00	.23495E+01	01340
.10110E-02	.94311E+00	-.40454E-01	.32374E-01	.12860E+00	.23779E+01	01350
.10815E-02	.94174E+00	-.44266E-01	.35220E-01	.12782E+00	.24021E+01	01360
.11519E-02	.94037E+00	-.48146E-01	.37983E-01	.12695E+00	.24314E+01	01370
.12224E-02	.93899E+00	-.52006E-01	.40678E-01	.12602E+00	.24572E+01	01380
.12928E-02	.93760E+00	-.55928E-01	.43318E-01	.12497E+00	.24825E+01	01390
.13633E-02	.93621E+00	-.59821E-01	.45902E-01	.12389E+00	.25074E+01	01400
.14320E-02	.93485E+00	-.63675E-01	.48376E-01	.12270E+00	.25309E+01	01410
.14936E-02	.93365E+00	-.67094E-01	.50547E-01	.12162E+00	.25513E+01	01420
.15482E-02	.93261E+00	-.70169E-01	.52432E-01	.12055E+00	.25685E+01	01430
.15975E-02	.93168E+00	-.72900E-01	.54086E-01	.11959E+00	.25834E+01	01440
.16416E-02	.93088E+00	-.75384E-01	.55518E-01	.11863E+00	.25958E+01	01450
.16821E-02	.93018E+00	-.77612E-01	.56779E-01	.11770E+00	.26064E+01	01460
.17191E-02	.92956E+00	-.79707E-01	.57872E-01	.11688E+00	.26153E+01	01470
.17525E-02	.92904E+00	-.81523E-01	.58791E-01	.11615E+00	.26225E+01	01480
.17825E-02	.92861E+00	-.83239E-01	.59547E-01	.11534E+00	.26280E+01	01490
.18096E-02	.92826E+00	-.84667E-01	.60153E-01	.11476E+00	.26325E+01	01500
.18343E-02	.92797E+00	-.86141E-01	.60637E-01	.11397E+00	.26355E+01	01510
.18572E-02	.92775E+00	-.87226E-01	.60996E-01	.11359E+00	.26378E+01	01520
.18783E-02	.92757E+00	-.88706E-01	.61267E-01	.11262E+00	.26382E+01	01530
.30000E+02	.19473E-02					01540
0.	0.	C.	0.	.12185E+00	.55093E+01	01550
.73043E-05	.16039E-01	-.86570E-05	.29861E-02	.12184E+00	.56159E+01	01560
.15339E-04	.33405E-01	-.37989E-04	.61136E-02	.12182E+00	.57256E+01	01570
.24104E-04	.52049E-01	-.92055E-04	.93473E-02	.12180E+00	.58368E+01	01580
.33782E-04	.72310E-01	-.17845E-03	.12714E-01	.12178E+00	.59498E+01	01590
.44556E-04	.94503E-01	-.30525E-03	.16222E-01	.12177E+00	.60642E+01	01600
.56426E-04	.11856E+00	-.48145E-03	.19812E-01	.12174E+00	.61773E+01	01610
.69391E-04	.14443E+00	-.71457E-03	.23423E-01	.12173E+00	.62862E+01	01620
.76512E-04	.15848E+00	-.85975E-03	.25276E-01	.12172E+00	.63399E+01	01630
.83634E-04	.17242E+00	-.10167E-02	.27039E-01	.12171E+00	.63893E+01	01640
.91486E-04	.18767E+00	-.12028E-02	.28881E-01	.12170E+00	.64390E+01	01650
.99338E-04	.20271E+00	-.14021E-02	.30621E-01	.12169E+00	.64838E+01	01660
.11669E-03	.23587E+00	-.18865E-02	.34111E-01	.12166E+00	.65657E+01	01670
.13586E-03	.27187E+00	-.24877E-02	.37437E-01	.12165E+00	.66303E+01	01680
.15704E-03	.31105E+00	-.32204E-02	.40504E-01	.12163E+00	.66713E+01	01690

.18042E-03	.35362E+00	-.41044E-02	.43199E-01	.12163E+00	.66811E+01	01700
.20616E-03	.39976E+00	-.51486E-02	.45393E-01	.12162E+00	.66505E+01	01710
.23447E-03	.44957E+00	-.63675E-02	.46946E-01	.12163E+00	.65689E+01	01720
.26752E-03	.50649E+00	-.78435E-02	.47728E-01	.12164E+00	.64128E+01	01730
.30386E-03	.56731E+00	-.94997E-02	.47456E-01	.12169E+00	.61703E+01	01740
.34403E-03	.63201E+00	-.11297E-01	.45979E-01	.12174E+00	.58236E+01	01750
.38822E-03	.69933E+00	-.13172E-01	.43216E-01	.12182E+00	.53604E+01	01760
.43643E-03	.76679E+00	-.14988E-01	.39261E-01	.12192E+00	.47819E+01	01770
.48939E-03	.83141E+00	-.16649E-01	.34428E-01	.12203E+00	.41034E+01	01780
.54764E-03	.88760E+00	-.18082E-01	.29517E-01	.12213E+00	.33852E+01	01790
.61173E-03	.92811E+00	-.19537E-01	.25944E-01	.12218E+00	.27482E+01	01800
.68222E-03	.94844E+00	-.21546E-01	.25307E-01	.12214E+00	.23353E+01	01810
.75544E-03	.95216E+00	-.24199E-01	.28085E-01	.12200E+00	.22007E+01	01820
.82867E-03	.94987E+00	-.27388E-01	.32756E-01	.12166E+00	.22198E+01	01830
.90190E-03	.94801E+00	-.30977E-01	.37561E-01	.12125E+00	.22592E+01	01840
.97512E-03	.94666E+00	-.34513E-01	.42102E-01	.12074E+00	.22878E+01	01850
.10482E-02	.94523E+00	-.38105E-01	.46499E-01	.12016E+00	.23140E+01	01860
.11212E-02	.94385E+00	-.41684E-01	.50740E-01	.11952E+00	.23389E+01	01870
.11942E-02	.94249E+00	-.45318E-01	.54861E-01	.11878E+00	.23628E+01	01880
.12673E-02	.94111E+00	-.48926E-01	.58877E-01	.11802E+00	.23861E+01	01890
.13403E-02	.93972E+00	-.52584E-01	.62814E-01	.11714E+00	.24090E+01	01900
.14134E-02	.93832E+00	-.56206E-01	.66666E-01	.11625E+00	.24315E+01	01910
.14846E-02	.93696E+00	-.59788E-01	.70360E-01	.11524E+00	.24527E+01	01920
.15485E-02	.93574E+00	-.62955E-01	.73602E-01	.11435E+00	.24711E+01	01930
.16051E-02	.93468E+00	-.65804E-01	.76420E-01	.11344E+00	.24865E+01	01940
.16562E-02	.93374E+00	-.68325E-01	.78897E-01	.11264E+00	.24999E+01	01950
.17019E-02	.93293E+00	-.70623E-01	.81047E-01	.11182E+00	.25110E+01	01960
.17439E-02	.93221E+00	-.72673E-01	.82941E-01	.11111E+00	.25206E+01	01970
.17822E-02	.93158E+00	-.74612E-01	.84587E-01	.11034E+00	.25284E+01	01980
.18169E-02	.93105E+00	-.76279E-01	.85970E-01	.10973E+00	.25349E+01	01990
.18480E-02	.93061E+00	-.77873E-01	.87108E-01	.10903E+00	.25397E+01	02000
.18761E-02	.93026E+00	-.79178E-01	.88018E-01	.10854E+00	.25436E+01	02010
.19017E-02	.92997E+00	-.80562E-01	.88742E-01	.10784E+00	.25460E+01	02020
.19254E-02	.92975E+00	-.81538E-01	.89272E-01	.10755E+00	.25481E+01	02030
.19473E-02	.92959E+00	-.82962E-01	.89665E-01	.10664E+00	.25481E+01	02040
.40000E+02	.20456E-02	0.	0.	.11053E+00	.55093E+01	02050
0.	.15735E-01	-.12549E-05	.38374E-02	.11052E+00	.56129F+01	02060
.76731E-05	.32777E-01	-.31952E-04	.78583E-02	.11051E+00	.57195E+01	02070
.16113E-04	.51680E-01	-.77603E-04	.12018E-01	.11049E+00	.58274E+01	02080
.25321E-04	.70976E-01	-.15079E-03	.16350E-01	.11048E+00	.59370E+01	02090
.35488E-04	.92779E-01	-.25853E-03	.20867E-01	.11047E+00	.60481E+01	02100
.46806E-04	.11642E+00	-.40878E-03	.25492E-01	.11045E+00	.61578E+01	02110
.59274E-04	.14185E+00	-.50827E-03	.30146E-01	.11044E+00	.62635E+01	02120
.72894E-04						02130

.80375E-04	.15566E+00	-.73287E-03	.32535E-01	.11043E+00	.63155E+01	02140
.87857E-04	.16937E+00	-.86785E-03	.34810E-01	.11042E+00	.63634E+01	02150
.96105E-04	.18437E+00	-.10282E-02	.37188E-01	.11041E+00	.64116E+01	02160
.10435E-03	.19926E+00	-.12004E-02	.39435E-01	.11040E+00	.64551E+01	02170
.12258E-03	.23179E+00	-.16200E-02	.43945E-01	.11039E+00	.65347E+01	02180
.14272E-03	.26722E+00	-.21434E-02	.48249E-01	.11038E+00	.65977E+01	02190
.16497E-03	.30580E+00	-.27847E-02	.52224E-01	.11037E+00	.66381E+01	02200
.18952E-03	.34773E+00	-.35629E-02	.55728E-01	.11037E+00	.66486E+01	02210
.21657E-03	.39321E+00	-.44884E-02	.58593E-01	.11037E+00	.66206E+01	02220
.24631E-03	.44235E+00	-.55766E-02	.60640E-01	.11039E+00	.65436E+01	02230
.28103E-03	.49856E+00	-.69060E-02	.61704E-01	.11041E+00	.63953E+01	02240
.31920E-03	.55875E+00	-.84131E-02	.61415E-01	.11047E+00	.61639E+01	02250
.36140E-03	.62297E+00	-.10068E-01	.59572E-01	.11052E+00	.58314E+01	02260
.40782E-03	.69011E+00	-.11820E-01	.56055E-01	.11061E+00	.53845E+01	02270
.45847E-03	.75790E+00	-.13542E-01	.50951E-01	.11071E+00	.48215E+01	02280
.51410E-03	.82369E+00	-.15137E-01	.44604E-01	.11084E+00	.41522E+01	02290
.57529E-03	.88218E+00	-.16505E-01	.37955E-01	.11095E+00	.34280E+01	02300
.64262E-03	.92598E+00	-.17823E-01	.32774E-01	.11103E+00	.27627E+01	02310
.71667E-03	.94546E+00	-.19607E-01	.31228E-01	.11102E+00	.23062E+01	02320
.79359E-03	.95483E+00	-.21998E-01	.34260E-01	.11095E+00	.21371E+01	02330
.87051E-03	.95276E+00	-.24860E-01	.40146E-01	.11072E+00	.21441E+01	02340
.94743E-03	.95080E+00	-.28162E-01	.46453E-01	.11040E+00	.21820E+01	02350
.10244E-02	.94949E+00	-.31408E-01	.52418E-01	.11002E+00	.22082E+01	02360
.11011E-02	.94807E+00	-.34679E-01	.58212E-01	.10957E+00	.22315E+01	02370
.11778E-02	.94670E+00	-.37934E-01	.63809E-01	.10909E+00	.22536E+01	02380
.12545E-02	.94535E+00	-.41224E-01	.69248E-01	.10852E+00	.22745E+01	02390
.13313E-02	.94397E+00	-.44483E-01	.74553E-01	.10795E+00	.22948E+01	02400
.14080E-02	.94258E+00	-.47774E-01	.79759E-01	.10726E+00	.23146E+01	02410
.14847E-02	.94118E+00	-.51022E-01	.84957E-01	.10660E+00	.23340E+01	02420
.15596E-02	.93980E+00	-.54230E-01	.89752E-01	.10581E+00	.23522E+01	02430
.16267E-02	.93857E+00	-.57051E-01	.94055E-01	.10514E+00	.23680E+01	02440
.16862E-02	.93748E+00	-.59593E-01	.97804E-01	.10443E+00	.23812E+01	02450
.17399E-02	.93652E+00	-.61825E-01	.10110E+00	.10383E+00	.23927E+01	02460
.17878E-02	.93568E+00	-.63872E-01	.10398E+00	.10318E+00	.24021E+01	02470
.18319E-02	.93494E+00	-.65680E-01	.10651E+00	.10264E+00	.24103E+01	02480
.18722E-02	.93429E+00	-.67409E-01	.10872E+00	.10202E+00	.24169E+01	02490
.19087E-02	.93374E+00	-.68873E-01	.11058E+00	.10155E+00	.24224E+01	02500
.19413E-02	.93329E+00	-.70305E-01	.11211E+00	.10097E+00	.24264E+01	02510
.19708E-02	.93292E+00	-.71445E-01	.11332E+00	.10061E+00	.24297E+01	02520
.19977E-02	.93264E+00	-.72710E-01	.11429E+00	.10001E+00	.24314E+01	02530
.20226E-02	.93241E+00	-.73541E-01	.11498E+00	.99834E-01	.24332E+01	02540
.20456E-02	.93227E+00	-.74895E-01	.11548E+00	.98998E-01	.24327E+01	02550
.50000E+02	.21729E-02	0.	0.	.98121E-01	.55093E+01	02560
0.	0.	0.	0.	0.	0.	02570

.81503E-05	.15352E-01	-.54128E-05	.45555E-02	.98114E-01	.56092E+01	02580
.17116E-04	.31586E-01	-.23987E-04	.93316E-02	.98104E-01	.57118E+01	02590
.26896E-04	.49859E-01	-.58521E-04	.14275E-01	.98096E-01	.58158E+01	02600
.37695E-04	.69297E-01	-.11422E-03	.19428E-01	.98084E-01	.59213E+01	02610
.49717E-04	.90604E-01	-.19671E-03	.24804E-01	.98076E-01	.60283E+01	02620
.62961E-04	.11372E+00	-.31249E-03	.30313E-01	.98062E-01	.61339E+01	02630
.77428E-04	.13859E+00	-.45725E-03	.35862E-01	.98055E-01	.62356E+01	02640
.85174E-04	.15210E+00	-.56445E-03	.38712E-01	.98049E-01	.62857E+01	02650
.93321E-04	.16551E+00	-.67012E-03	.41427E-01	.98045E-01	.63318E+01	02660
.10208E-03	.18020E+00	-.79610E-03	.44268E-01	.98039E-01	.63783E+01	02670
.11084E-03	.19477E+00	-.93119E-03	.46952E-01	.98036E-01	.64202E+01	02680
.13020E-03	.22662E+00	-.12649E-02	.52349E-01	.98025E-01	.64971E+01	02690
.15160E-03	.26132E+00	-.16836E-02	.57508E-01	.98026E-01	.65583E+01	02700
.17523E-03	.29912E+00	-.22015E-02	.62286E-01	.98021E-01	.65981E+01	02710
.20131E-03	.34023E+00	-.28363E-02	.66513E-01	.98033E-01	.66098E+01	02720
.23004E-03	.38485E+00	-.35995E-02	.69994E-01	.98041E-01	.65849E+01	02730
.26162E-03	.42311E+00	-.45076E-02	.72512E-01	.98069E-01	.65139E+01	02740
.29850E-03	.48239E+00	-.56319E-02	.73880E-01	.98099E-01	.63756E+01	02750
.33905E-03	.54772E+00	-.69262E-02	.73647E-01	.98155E-01	.61581E+01	02760
.38389E-03	.61124E+00	-.83726E-02	.71567E-01	.98219E-01	.58437E+01	02770
.43319E-03	.67801E+00	-.99326E-02	.67472E-01	.98105E-01	.54180E+01	02780
.48698E-03	.74606E+00	-.11499E-01	.61421E-01	.98413E-01	.48760E+01	02790
.54607E-03	.81309E+00	-.12977E-01	.53740E-01	.98535E-01	.42214E+01	02800
.61107E-03	.87429E+00	-.14240E-01	.45408E-01	.98658E-01	.34943E+01	02810
.68259E-03	.92224E+00	-.15378E-01	.38416E-01	.98753E-01	.27970E+01	02820
.76124E-03	.95002E+00	-.16863E-01	.35470E-01	.98788E-01	.22852E+01	02830
.84294E-03	.95788E+00	-.18932E-01	.38177E-01	.98776E-01	.20683E+01	02840
.92465E-03	.95628E+00	-.21389E-01	.44899E-01	.98645E-01	.20562E+01	02850
.10064E-02	.95418E+00	-.24314E-01	.52587E-01	.98418E-01	.20921E+01	02860
.10881E-02	.95291E+00	-.27202E-01	.59893E-01	.98174E-01	.21160E+01	02870
.11696E-02	.95153E+00	-.30062E-01	.67016E-01	.97844E-01	.21359E+01	02880
.12511E-02	.95017E+00	-.32910E-01	.73918E-01	.97526E-01	.21549E+01	02890
.13326E-02	.94883E+00	-.35762E-01	.80627E-01	.97115E-01	.21725E+01	02900
.14141E-02	.94746E+00	-.38581E-01	.87174E-01	.96734E-01	.21894E+01	02910
.14956E-02	.94608E+00	-.41412E-01	.93607E-01	.96246E-01	.22058E+01	02920
.15771E-02	.94466E+00	-.44191E-01	.99913E-01	.95802E-01	.22217E+01	02930
.16565E-02	.94327E+00	-.46930E-01	.10598E+00	.95243E-01	.22366E+01	02940
.17279E-02	.94201E+00	-.49318E-01	.11131E+00	.94793E-01	.22496E+01	02950
.17910E-02	.94090E+00	-.51477E-01	.11598E+00	.94282E-01	.22603E+01	02960
.18481E-02	.93991E+00	-.53352E-01	.12009E+00	.93876E-01	.22696E+01	02970
.18990E-02	.93903E+00	-.55085E-01	.12368E+00	.93403E-01	.22773E+01	02980
.19459E-02	.93825E+00	-.56593E-01	.12685E+00	.93039E-01	.22839E+01	02990
.19887E-02	.93757E+00	-.58064E-01	.12963E+00	.92575E-01	.22892E+01	03000
.20274E-02	.93700E+00	-.59278E-01	.13197E+00	.92264E-01	.22936E+01	03010

.20620E-02	.93652E+00	-.60512E-01	.13390E+00	.91811E-01	.22967E+01	01620
.20934E-02	.93614E+00	-.61450E-01	.13543E+00	.91588E-01	.22993E+01	01030
.21219E-02	.93584E+00	-.62575E-01	.13663E+00	.91088E-01	.23004E+01	03040
.21484E-02	.93562E+00	-.63230E-01	.13748E+00	.91038E-01	.23018E+01	03050
.21729E-02	.93549E+00	-.64506E-01	.13808E+00	.90285E-01	.23009E+01	03060
.60C00E+02	.23293E-02	0.	0.	.85637E-01	.55093E+01	03070
.87369E-05	.14919E-01	-.31920E-05	.51160E-02	.85633E-01	.56049E+01	03080
.18347E-04	.31092E-01	-.14340E-04	.10484E-01	.85628E-01	.57031E+01	03100
.28832E-04	.48477E-01	-.35385E-04	.16044E-01	.85623E-01	.58026E+01	03110
.40408E-04	.67396E-01	-.69812E-04	.21844E-01	.85616E-01	.59036E+01	03120
.53295E-04	.88143E-01	-.12157E-03	.27901E-01	.85611E-01	.60059E+01	03130
.67492E-04	.11066E+00	-.19531E-03	.34114E-01	.85604E-01	.61069E+01	03140
.83000E-04	.13489E+00	-.29542E-03	.40377E-01	.85601E-01	.62042E+01	03150
.91519E-04	.14806E+00	-.35909E-03	.43598E-01	.85598E-01	.62522E+01	03160
.10004E-03	.16114E+00	-.42885E-03	.46667E-01	.85596E-01	.62964E+01	03170
.10943E-03	.17546E+00	-.51272E-03	.49881E-01	.85594E-01	.63409E+01	03180
.11882E-03	.18967E+00	-.60388E-03	.52921E-01	.85594E-01	.63811E+01	03190
.13957E-03	.22074E+00	-.83010E-03	.59039E-01	.85590E-01	.64550E+01	03200
.16251E-03	.25460E+00	-.11197E-02	.64902E-01	.85596E-01	.65142E+01	03210
.18784E-03	.29150E+00	-.14844E-02	.70350E-01	.85600E-01	.65534E+01	03220
.21580E-03	.33166E+00	-.19401E-02	.75192E-01	.85617E-01	.65662E+01	03230
.24660E-03	.37527E+00	-.24991E-02	.79209E-01	.85633E-01	.65449E+01	03240
.28045E-03	.42249E+00	-.31782E-02	.82161E-01	.85665E-01	.64805E+01	03250
.31999E-03	.47666E+00	-.40381E-02	.83842E-01	.85703E-01	.63531E+01	03260
.36345E-03	.53492E+00	-.50524E-02	.83737E-01	.85760E-01	.61512E+01	03270
.41151E-03	.59754E+00	-.62150E-02	.81556E-01	.85827E-01	.58574E+01	03280
.46436E-03	.66373E+00	-.75032E-02	.77087E-01	.85913E-01	.54563E+01	03290
.52203E-03	.73182E+00	-.88321E-02	.70343E-01	.86012E-01	.49400E+01	03300
.58537E-03	.79997E+00	-.10116E-01	.61590E-01	.86124E-01	.43058E+01	03310
.65505E-03	.86393E+00	-.11211E-01	.51755E-01	.86246E-01	.35817E+01	03320
.73171E-03	.91654E+00	-.12120E-01	.42889E-01	.86345E-01	.28546E+01	03330
.81602E-03	.94963E+00	-.13232E-01	.38118E-01	.86408E-01	.22801E+01	03340
.90361E-03	.96095E+00	-.14920E-01	.39856E-01	.86430E-01	.20024E+01	03350
.99120E-03	.96026E+00	-.16928E-01	.46873E-01	.86395E-01	.19621E+01	03360
.10788E-02	.95800E+00	-.19394E-01	.55718E-01	.86236E-01	.19947E+01	03370
.11664E-02	.95678E+00	-.21876E-01	.64238E-01	.86105E-01	.20167E+01	03380
.12537E-02	.95547E+00	-.24253E-01	.72568E-01	.85876E-01	.20330E+01	03390
.13411E-02	.95412E+00	-.26623E-01	.80689E-01	.85693E-01	.20488E+01	03400
.14285E-02	.95281E+00	-.28964E-01	.88584E-01	.85417E-01	.20629E+01	03410
.15158E-02	.95146E+00	-.31267E-01	.96298E-01	.85195E-01	.20763E+01	03420
.16032E-02	.95009E+00	-.33559E-01	.10389E+00	.84876E-01	.20891E+01	03430
.16906E-02	.94867E+00	-.35790E-01	.11133E+00	.84621E-01	.21015E+01	03440
.17758E-02	.94726E+00	-.37982E-01	.11851E+00	.84261E-01	.21130E+01	03450

.18522E-02	.94598E+00	.39867E-01	.12484E+00	.84006E-01	.21229E+01	03460
.19199E-02	.94484E+00	.41580E-01	.13037E+00	.83678E-01	.21311E+01	03470
.19811E-02	.94381E+00	.43038E-01	.13527E+00	.83148E-01	.21382E+01	03480
.20357E-02	.94290E+00	.44410E-01	.13957E+00	.83138E-01	.21439E+01	03490
.20859E-02	.94208E+00	.45569E-01	.14337E+00	.82935E-01	.21489E+01	03500
.21318E-02	.94136E+00	.46741E-01	.14672E+00	.82619E-01	.21527E+01	03510
.21733E-02	.94074E+00	.47666E-01	.14954E+00	.82454E-01	.21561E+01	03520
.22104E-02	.94023E+00	.48673E-01	.15187E+00	.82126E-01	.21582E+01	03530
.22441E-02	.93982E+00	.49378E-01	.15372E+00	.82031E-01	.21601E+01	03540
.22746E-02	.93952E+00	.50344E-01	.15517E+00	.81632E-01	.21607E+01	03550
.23030E-02	.93928E+00	.50798E-01	.15616E+00	.81703E-01	.21618E+01	03560
.23293E-02	.93917E+00	.51944E-01	.15685E+00	.81031E-01	.21605E+01	03570
.70000E+02	.25128E-02	0.	0.	.73900E-01	.55093E+01	03580
.94253E-05	.14456E-01	.67854E-06	.54922E-02	.73899E-01	.56003E+01	03590
.19793E-04	.30137E-01	.33595E-05	.11260E-01	.73897E-01	.56938E+01	03600
.31104E-04	.47002E-01	.90235E-05	.17239E-01	.73896E-01	.57885E+01	03610
.43592E-04	.65360E-01	.19136E-04	.23482E-01	.73894E-01	.58847E+01	03620
.57495E-04	.85503E-01	.35711E-04	.30008E-01	.73893E-01	.59820E+01	03630
.72811E-04	.10738E+00	.61235E-04	.36710E-01	.73891E-01	.60782E+01	03640
.89541E-04	.13092E+00	.98515E-04	.43474E-01	.73892E-01	.61709E+01	03650
.98730E-04	.14373E+00	.12135E-03	.46956E-01	.73892E-01	.62166E+01	03660
.10792E-03	.15644E+00	.15192E-03	.50276E-01	.73892E-01	.62588E+01	03670
.11805E-03	.17036E+00	.18715E-03	.53756E-01	.73893E-01	.63013E+01	03680
.12818E-03	.18418E+00	.22664E-03	.57051E-01	.73895E-01	.63397E+01	03690
.15057E-03	.21440E+00	.32916E-03	.63693E-01	.73899E-01	.64105E+01	03700
.17531E-03	.24735E+00	.46826E-03	.70074E-01	.73909E-01	.64676E+01	03710
.20264E-03	.28327E+00	.65391E-03	.76026E-01	.73921E-01	.65061E+01	03720
.21281E-03	.32238E+00	.89874E-03	.81344E-01	.73940E-01	.65201E+01	03730
.26603E-03	.36487E+00	.12154E-02	.85796E-01	.73963E-01	.65026E+01	03740
.30255E-03	.41092E+00	.16199E-02	.89122E-01	.73996E-01	.64449E+01	03750
.34520E-03	.46382E+00	.21580E-02	.91112E-01	.74038E-01	.63289E+01	03760
.39209E-03	.52085E+00	.28244E-02	.91200E-01	.74092E-01	.61434E+01	03770
.44393E-03	.58235E+00	.36240E-02	.89366E-01	.74157E-01	.56715E+01	03780
.50096E-03	.64773E+00	.45491E-02	.84654E-01	.74232E-01	.54972E+01	03790
.56316E-03	.71560E+00	.55400E-02	.77325E-01	.74322E-01	.50102E+01	03800
.63150E-03	.78458E+00	.45258E-02	.67862E-01	.74415E-01	.44019E+01	03810
.70667E-03	.85109E+00	.73572E-02	.66863E-01	.74525E-01	.36883E+01	03820
.78927E-03	.90850E+00	.79675E-02	.46274E-01	.74612E-01	.29378E+01	03830
.88033E-03	.94777E+00	.86197E-02	.39435E-01	.74686E-01	.22980E+01	03840
.97482E-03	.96363E+00	.98531E-02	.39612E-01	.74710E-01	.19479E+01	03850
.10693E-02	.98446E+00	.11404E-01	.46264E-01	.74744E-01	.18681E+01	03860
.11633E-02	.96208E+00	.13360E-01	.55898E-01	.74629E-01	.18945E+01	03870
.12583E-02	.96090E+00	.15414E-01	.65454E-01	.74570E-01	.19153E+01	03880

.13525E-02	.95971E+00	-.17274E-01	.74814E-01	.74412E-01	.19278E+01	03900
.14468E-02	.95840E+00	-.19123E-01	.84024E-01	.74314E-01	.19403E+01	03910
.15410E-02	.95714E+00	-.20912E-01	.92983E-01	.74135E-01	.19511E+01	03920
.16353E-02	.95583E+00	-.22651E-01	.10175E+00	.74019E-01	.19609E+01	03930
.17296E-02	.95444E+00	-.24350E-01	.11039E+00	.73824E-01	.19702E+01	03940
.18238E-02	.95308E+00	-.25930E-01	.11888E+00	.73701E-01	.19790E+01	03950
.19157E-02	.95167E+00	-.27590E-01	.12707E+00	.73492E-01	.19870E+01	03960
.19982E-02	.95037E+00	-.28922E-01	.13331E+00	.73380E-01	.19939E+01	03970
.20712E-02	.94921E+00	-.30151E-01	.14064E+00	.73194E-01	.19995E+01	03980
.21372E-02	.94814E+00	-.31155E-01	.14630E+00	.73101E-01	.20043E+01	03990
.21961E-02	.94719E+00	-.32132E-01	.15126E+00	.72922E-01	.20080E+01	04000
.22505E-02	.94633E+00	-.32912E-01	.15567E+00	.72849E-01	.20114E+01	04010
.22998E-02	.94557E+00	-.33759E-01	.15956E+00	.72655E-01	.20138E+01	04020
.23446E-02	.94490E+00	-.34349E-01	.16286E+00	.72613E-01	.20160E+01	04030
.23846E-02	.94436E+00	-.35131E-01	.16550E+00	.72390E-01	.20172E+01	04040
.24209E-02	.94392E+00	-.35582E-01	.16775E+00	.72406E-01	.20186E+01	04050
.24539E-02	.94359E+00	-.36383E-01	.16945E+00	.72097E-01	.20186E+01	04060
.24845E-02	.94334E+00	-.36616E-01	.17058E+00	.72274E-01	.20195E+01	04070
.25128E-02	.94324E+00	-.37746E-01	.17133E+00	.71672E-01	.20179E+01	04080
.80000E+02	.27205E-02	0.	0.	.63439E-01	.55093E+01	04090
.10204E-04	.13996E-01	.19663E-05	.58721E-02	.63441E-01	.55956E+01	04100
.21429E-04	.29186E-01	.82733E-05	.11634E-01	.63442E-01	.56844E+01	04110
.33674E-04	.45531E-01	.18933E-04	.17821E-01	.63444E-01	.57742E+01	04120
.47195E-04	.63332E-01	.34703E-04	.24286E-01	.63447E-01	.58655E+01	04130
.62246E-04	.82872E-01	.55631E-04	.31053E-01	.63448E-01	.59580E+01	04140
.78828E-04	.10410E+00	.81626E-04	.38010E-01	.63452E-01	.60494E+01	04150
.95941E-04	.12696E+00	.11164E-03	.45041E-01	.63455E-01	.61375E+01	04160
.10689E-03	.13939E+00	.12803E-03	.48664E-01	.63458E-01	.61810E+01	04170
.11684E-03	.15174E+00	.14417E-03	.52122E-01	.63461E-01	.62211E+01	04180
.12781E-03	.16525E+00	.16129E-03	.56749E-01	.63464E-01	.62616E+01	04190
.13778E-03	.17868E+00	.17749E-03	.59187E-01	.63468E-01	.62983E+01	04200
.16301E-03	.20804E+00	.20864E-03	.66129E-01	.63478E-01	.63660E+01	04210
.18980E-03	.24007E+00	.23290E-03	.72818E-01	.63490E-01	.64210E+01	04220
.21939E-03	.27499E+00	.24268E-03	.79080E-01	.63507E-01	.64588E+01	04230
.25205E-03	.31301E+00	.22955E-03	.84707E-01	.63528E-01	.64739E+01	04240
.28802E-03	.35435E+00	.18125E-03	.89455E-01	.63555E-01	.64591E+01	04250
.32756E-03	.39919E+00	.84352E-04	.93070E-01	.63584E-01	.64085E+01	04260
.37373E-03	.45075E+00	.58460E-04	.95334E-01	.63528E-01	.63034E+01	04270
.42450E-03	.50655E+00	.35150E-03	.95650E-01	.63676E-01	.61337E+01	04280
.48082E-03	.56669E+00	.71851E-03	.93681E-01	.63734E-01	.58831E+01	04290
.54236E-03	.63106E+00	.11914E-02	.89139E-01	.63795E-01	.55357E+01	04300
.60971E-03	.68844E+00	.17421E-02	.81916E-01	.63869E-01	.50792E+01	04310
.68369E-03	.76786E+00	.23083E-02	.72164E-01	.63938E-01	.45004E+01	04320
						04330

.76507E-03	.83644E+00	..27522E-02	.60463E-01	.64025E-01	.38046E+01	04340
.85461E-03	.89834E+00	..29614E-02	.48543E-01	.64025E-01	.30408E+01	04350
.95308E-03	.94416E+00	..30598E-02	.39702E-01	.64151E-01	.23407E+01	04360
.10554E-02	.96549E+00	..37307E-02	.37937E-01	.64152E-01	.19109E+01	04370
.11577E-02	.96859E+00	..48362E-02	.43581E-01	.64207E-01	.17803E+01	04380
.12600E-02	.96625E+00	..62850E-02	.53483E-01	.64114E-01	.17957E+01	04390
.13623E-02	.96507E+00	..79122E-02	.63820E-01	.64076E-01	.18160E+01	04400
.14643E-02	.96406E+00	..92781E-02	.73959E-01	.63956E-01	.18244E+01	04410
.15664E-02	.96282E+00	..10590E-01	.84062E-01	.63888E-01	.18337E+01	04420
.16684E-02	.96165E+00	..11832E-01	.93905E-01	.63761E-01	.18412E+01	04430
.17704E-02	.96041E+00	..12988E-01	.10356E+00	.63690E-01	.18476E+01	04440
.18725E-02	.95911E+00	..14110E-01	.11308E+00	.63566E-01	.18534E+01	04450
.19745E-02	.95775E+00	..15115E-01	.12246E+00	.63510E-01	.18587E+01	04460
.20740E-02	.95637E+00	..16109E-01	.13152E+00	.63392E-01	.18634E+01	04470
.21633E-02	.95508E+00	..16867E-01	.13955E+00	.63364E-01	.18673E+01	04480
.22424E-02	.95390E+00	..17594E-01	.14662E+00	.63270E-01	.18704E+01	04490
.23138E-02	.95282E+00	..18125E-01	.15290E+00	.63264E-01	.18730E+01	04500
.23776E-02	.95185E+00	..18692E-01	.15844E+00	.63177E-01	.18748E+01	04510
.24363E-02	.95095E+00	..19077E-01	.16340E+00	.63193E-01	.18766E+01	04520
.24898E-02	.95015E+00	..19586E-01	.16779E+00	.63088E-01	.18776E+01	04530
.25383E-02	.94944E+00	..19868E-01	.17152E+00	.63134E-01	.18798E+01	04540
.25817E-02	.94877E+00	..20377E-01	.17464E+00	.62993E-01	.18791E+01	04550
.26210E-02	.94839E+00	..20563E-01	.17709E+00	.63094E-01	.18799E+01	04560
.26567E-02	.94804E+00	..21199E-01	.17902E+00	.62854E-01	.18794E+01	04570
.26898E-02	.94777E+00	..21195E-01	.18027E+00	.63120E-01	.18803E+01	04580
.27205E-02	.94767E+00	..22286E-01	.18107E+00	.62568E-01	.18785E+01	04590
.90000E+02	.29473E-02	0.	0.	.54495E-01	.55093E+01	04600
.11055E-04	.13569E-01	.45648E-05	.56575E-02	.54499E-01	.55911E+01	04610
.20216E-04	.28301E-01	.19797E-04	.11403E-01	.54504E-01	.56753E+01	04620
.36483E-04	.44162E-01	.46655E-04	.17792E-01	.54508E-01	.57605E+01	04630
.51131E-04	.61443E-01	.88199E-04	.2259E-01	.54514E-01	.58472E+01	04640
.67437E-04	.80419E-01	.14652E-03	.31036E-01	.54518E-01	.59350E+01	04650
.85402E-04	.10104E+00	.22402E-03	.38010E-01	.54527E-01	.60219E+01	04660
.10503E-03	.12325E+00	.32147E-02	.5068E-01	.54531E-01	.61057E+01	04670
.11580E-03	.13534E+00	.37948E-03	.48709E-01	.54537E-01	.61471E+01	04680
.12658E-03	.14734E+00	.44039E-03	.52180E-01	.54540E-01	.61853E+01	04690
.13847E-03	.16048E+00	.51023E-03	.55839E-01	.54546E-01	.62239E+01	04700
.15035E-03	.17354E+00	.58267E-03	.59303E-01	.54551E-01	.62589E+01	04710
.17661E-03	.20209E+00	.74907E-03	.66311E-01	.54566E-01	.63238E+01	04720
.20563E-03	.23324E+00	.93948E-03	.73082E-01	.54579E-01	.63767E+01	04730
.23769E-03	.26720E+00	.11490E-02	.79646E-01	.54600E-01	.64136E+01	04740
.27307E-03	.30420E+00	.17744E-02	.85192E-01	.54619E-01	.64295E+01	04750
.31204E-03	.34443E+00	.16046E-02	.90087E-01	.54647E-01	.64182E+01	04760
						04770

.35488E-03	.38808E+00	.18304E-02	.93863E-01	.54675E-01	.63725E+01	04790
.40490E-03	.43832E+00	.20462E-02	.96327E-01	.54714E-01	.62769E+01	04790
.45900E-03	.49208E+00	.22207E-02	.96867E-01	.54752E-01	.61212E+01	04800
.52070E-03	.55163E+00	.23344E-02	.95138E-01	.54801E-01	.58900E+01	04810
.58759E-03	.61488E+00	.23778E-02	.92834E-01	.54844E-01	.55674E+01	04820
.66055E-03	.68153E+00	.23625E-02	.83830E-01	.54899E-01	.51400E+01	04830
.74071E-03	.75102E+00	.23349E-02	.74140E-01	.54940E-01	.45915E+01	04840
.82887E-03	.82108E+00	.24156E-02	.62244E-01	.54997E-01	.39184E+01	04850
.92588E-03	.88674E+00	.27394E-02	.49561E-01	.55024E-01	.31522E+01	04860
.10326E-02	.93887E+00	.32977E-02	.39117E-01	.55061E-01	.24029E+01	04870
.11434E-02	.96629E+00	.33239E-02	.35357E-01	.55024E-01	.18932E+01	04880
.12542E-02	.97236E+00	.26711E-02	.39532E-01	.55049E-01	.17036E+01	04890
.13651E-02	.97032E+00	.16727E-02	.49108E-01	.54956E-01	.17018E+01	04900
.14759E-02	.96909E+00	.44094E-03	.59870E-01	.54890E-01	.17217E+01	04910
.15864E-02	.96833E+00	.50176E-03	.70475E-01	.54773E-01	.17267E+01	04920
.16970E-02	.96722E+00	.13009E-02	.81191E-01	.54685E-01	.17322E+01	04930
.18075E-02	.96616E+00	.20437E-02	.91675E-01	.54568E-01	.17365E+01	04940
.19181E-02	.96503E+00	.26374E-02	.10198E+00	.54488E-01	.17394E+01	04950
.20286E-02	.96382E+00	.32035E-02	.11216E+00	.54383E-01	.17419E+01	04960
.21392E-02	.96254E+00	.36025E-02	.12222E+00	.54335E-01	.17440E+01	04970
.22470E-02	.96122E+00	.40065E-02	.13194E+00	.54251E-01	.17455E+01	04980
.23474E-02	.95997E+00	.42035E-02	.14057E+00	.54248E-01	.17467E+01	04990
.24294E-02	.95882E+00	.44349E-02	.14818E+00	.54196E-01	.17473E+01	05000
.25068E-02	.95775E+00	.44998E-02	.15497E+00	.54228E-01	.17479E+01	05010
.25759E-02	.95677E+00	.46588E-02	.16097E+00	.54189E-01	.17480E+01	05020
.26395E-02	.95586E+00	.46532E-02	.16637E+00	.54250E-01	.17482E+01	05030
.26975E-02	.95504E+00	.48245E-02	.17117E+00	.54200E-01	.17480E+01	05040
.27500E-02	.95431E+00	.47823E-02	.17527E+00	.54296E-01	.17481E+01	05050
.27970E-02	.95371E+00	.50405E-02	.17870E+00	.54210E-01	.17476E+01	05060
.28396E-02	.95320E+00	.49617E-02	.18141E+00	.54366E-01	.17479E+01	05070
.28782E-02	.95284E+00	.54443E-02	.18354E+00	.54175E-01	.17470E+01	05080
.29142E-02	.95254E+00	.51909E-02	.18488E+00	.54509E-01	.17480E+01	05090
.29473E-02	.95247E+00	.62921E-02	.18572E+00	.53979E-01	.17459E+01	05100
.10000E+03	.31869E-02	0.	0.	.47092E-01	.55093E+01	05110
.11954E-04	.13201E-01	.69531E-05	.54612E-02	.47098E-01	.55970E+01	05120
.25103E-04	.27542E-01	.30490E-04	.11211E-01	.47105E-01	.56670E+01	05130
.39448E-04	.42986E-01	.72399E-04	.17190E-01	.47111E-01	.57481E+01	05140
.55286E-04	.59819E-01	.13798E-03	.23449E-01	.47121E-01	.58305E+01	05150
.72910E-04	.78310E-01	.23122E-03	.30014E-01	.47126E-01	.59142E+01	05160
.92342E-04	.98409E-01	.35695E-03	.36778E-01	.47139E-01	.59970E+01	05170
.11356E-03	.12007E+00	.51772E-03	.43632E-01	.47144E-01	.60769E+01	05180
.12522E-03	.13185E+00	.61488E-03	.47172E-01	.47151E-01	.61164E+01	05190
.13687E-03	.14355E+00	.71798E-03	.50535E-01	.47155E-01	.61530E+01	05200
						05210

.14972E-03	.15637E+00	.83758E-03	.54110E-01	.47163E-01	.61899E+01	05220
.16257E-03	.14910E+00	.96318E-03	.57485E-01	.47168E-01	.62233E+01	05230
.14096E-03	.19695E+00	.12578E-02	.64321E-01	.47196E-01	.62855E+01	05240
.22234E-03	.22732E+00	.16065E-02	.70946E-01	.47198E-01	.63365E+01	05250
.25701E-03	.26045E+00	.20072E-02	.77191E-01	.47223E-01	.63725E+01	05260
.29526E-03	.29653E+00	.24628E-02	.82858E-01	.47236E-01	.63867E+01	05270
.33740E-03	.31577E+00	.29636E-02	.87719E-01	.47266E-01	.63794E+01	05280
.38372E-03	.37835E+00	.35066E-02	.91517E-01	.47287E-01	.63380E+01	05290
.43781E-03	.42740E+00	.41092E-02	.94075E-01	.47322E-01	.62459E+01	05300
.49728E-03	.48052E+00	.47273E-02	.94790E-01	.47348E-01	.61056E+01	05310
.56303E-03	.53823E+00	.53395E-02	.93233E-01	.47385E-01	.58904E+01	05320
.63535E-03	.60036E+00	.59376E-02	.89368E-01	.47410E-01	.55887E+01	05330
.71424E-03	.66619E+00	.65151E-02	.82773E-01	.47443E-01	.51867E+01	05340
.80091E-03	.73544E+00	.71188E-02	.73498E-01	.47458E-01	.46660E+01	05350
.85624E-03	.80639E+00	.78461E-02	.61888E-01	.47481E-01	.40171E+01	05360
.10011E-02	.87492E+00	.88435E-02	.49076E-01	.47472E-01	.32572E+01	05370
.11165E-02	.93253E+00	.10166E-01	.37685E-01	.47467E-01	.24733E+01	05380
.12363E-02	.96604E+00	.11028E-01	.32241E-01	.47385E-01	.18913E+01	05390
.13562E-02	.97554E+00	.10879E-01	.34792E-01	.47342E-01	.16397E+01	05400
.14760E-02	.97411E+00	.10248E-01	.43522E-01	.47224E-01	.16155E+01	05410
.15958E-02	.97282E+00	.93532E-02	.54270E-01	.47096E-01	.16346E+01	05420
.17154E-02	.97234E+00	.87367E-02	.64976E-01	.46953E-01	.16363E+01	05430
.18349E-02	.97140E+00	.83862E-02	.75945E-01	.46812E-01	.16379E+01	05440
.19545E-02	.97050E+00	.80718E-02	.86758E-01	.46666E-01	.16392E+01	05450
.20740E-02	.96953E+00	.79814E-02	.97406E-01	.46543E-01	.16388E+01	05460
.21935E-02	.96845E+00	.79158E-02	.10795E+00	.46414E-01	.16382E+01	05470
.23131E-02	.96731E+00	.80707E-02	.11839E+00	.46331E-01	.16372E+01	05480
.24296E-02	.96609E+00	.82145E-02	.12850E+00	.46234E-01	.16359E+01	05490
.25342E-02	.96493E+00	.83371E-02	.13749E+00	.46214E-01	.16346E+01	05500
.26269E-02	.96384E+00	.87741E-02	.14542E+00	.46161E-01	.16331E+01	05510
.27105E-02	.96281E+00	.91425E-02	.15252E+00	.46188E-01	.16318E+01	05520
.27852E-02	.96188E+00	.93728E-02	.15882E+00	.46159E-01	.16304E+01	05530
.28540E-02	.96098E+00	.97409E-02	.16449E+00	.46226E-01	.16292E+01	05540
.29167E-02	.96018E+00	.98920E-02	.16957E+00	.46196E-01	.16278E+01	05550
.29735E-02	.95945E+00	.10234E-01	.17391E+00	.46307E-01	.16270E+01	05560
.30243E-02	.95885E+00	.10213E-01	.17758E+00	.46248E-01	.16257E+01	05570
.30703E-02	.95833E+00	.10538E-01	.18047E+00	.46427E-01	.16255E+01	05580
.31122E-02	.95797E+00	.10188E-01	.18274E+00	.46264E-01	.16242E+01	05590
.31510E-02	.95765E+00	.10695E-01	.18414E+00	.46642E-01	.16254E+01	05600
.31869E-02	.95761E+00	.95035E-02	.18500E+00	.46101E-01	.16230E+01	05610
.31000E+03	.34309E-02	0.	0.	.46101E-01	.16230E+01	05620
0.	0.	0.	0.	.41109E-01	.55093E+01	05630
.12869E-04	.12915E-01	.90154E-05	.51064E-02	.41117E-01	.55834E+01	05640
.27025E-04	.26948E-01	.39826E-04	.10487E-01	.41126E-01	.56598E+01	05650

.42468C-04	.42C67E-01	.94R87E-04	.160R5E-01	.41133E-01	.57373E+01	05660
.59520E-04	.58550E-01	.1R157E-03	.21950E-01	.41145E-01	.58162E+01	05670
.7R502E-04	.76662E-01	.30546E-03	.28107E-01	.41150E-01	.5R962E+01	05680
.94415E-04	.96352E-01	.47366E-03	.34457E-01	.41167E-01	.59755E+01	05690
.12226E-03	.11757E+00	.69031E-03	.40897E-01	.41171E-01	.60522E+01	05700
.13481E-03	.12912E+00	.82209E-03	.44225E-01	.41180E-01	.60901E+01	05710
.14735E-03	.14059E+00	.96257E-03	.47409E-01	.41184E-01	.61251E+01	05720
.16119E-03	.15314E+00	.11263E-02	.50756E-01	.41193E-01	.61606E+01	05730
.17502E-03	.16562E+00	.12992E-02	.53933E-01	.41198E-01	.61927E+01	05740
.20559E-03	.19290E+00	.17080E-02	.60387E-01	.41218E-01	.62525E+01	05750
.23937E-03	.22266E+00	.21985E-02	.66648E-01	.41228E-01	.63017E+01	05760
.27669E-03	.25511E+00	.27713E-02	.72565E-01	.41252E-01	.63365E+01	05770
.31787E-03	.29045E+00	.34354E-02	.77955E-01	.41265E-01	.63526E+01	05780
.36323E-03	.32R88E+00	.41933E-02	.72607E-01	.41291E-01	.63445E+01	05790
.41310E-03	.37059E+00	.50193E-02	.86269E-01	.41306E-01	.63059E+01	05800
.47134E-03	.41863E+00	.59833E-02	.88795E-01	.41334E-01	.62230E+01	05810
.53536E-03	.47069E+00	.70235E-02	.83607E-01	.41348E-01	.60870E+01	05820
.60614E-03	.52733E+00	.81197E-02	.8R385E-01	.41373E-01	.58835E+01	05830
.68400E-03	.58844E+00	.92719E-02	.84833E-01	.41380E-01	.55979E+01	05840
.76894E-03	.65345E+00	.10461E-01	.78790E-01	.41392E-01	.52160E+01	05850
.86224E-03	.72231E+00	.11745E-01	.70185E-01	.41382E-01	.47183E+01	05860
.96487E-03	.79369E+00	.13200E-01	.59263E-01	.41373E-01	.40915E+01	05870
.10778E-02	.86418E+00	.14986E-01	.46914E-01	.41331E-01	.33423E+01	05880
.12020E-02	.92610E+00	.17168E-01	.35327E-01	.41279E-01	.25380E+01	05890
.13310E-02	.96509E+00	.18970E-01	.28787E-01	.41152E-01	.18972E+01	05900
.14600E-02	.97807E+00	.19404E-01	.29866E-01	.41021E-01	.15883E+01	05910
.15890E-02	.97746E+00	.19071E-01	.37428E-01	.40854E-01	.15387E+01	05920
.17180E-02	.97614E+00	.18434E-01	.47696E-01	.40649E-01	.15561E+01	05930
.18467E-02	.97596E+00	.18050E-01	.58108E-01	.40456E-01	.15547E+01	05940
.19754E-02	.97524E+00	.18057E-01	.68915E-01	.40247E-01	.15524E+01	05950
.21041E-02	.97452E+00	.18090E-01	.79681E-01	.40050E-01	.15507E+01	05960
.22328E-02	.97376E+00	.18418E-01	.90299E-01	.39866E-01	.15473E+01	05970
.23615E-02	.97286E+00	.18782E-01	.10086E+00	.39686E-01	.15439E+01	05980
.24902E-02	.97189E+00	.19411E-01	.11132E+00	.39548E-01	.15401E+01	05990
.26157E-02	.97083E+00	.20041E-01	.12148E+00	.39404E-01	.15363E+01	06000
.27283E-02	.96981E+00	.20817E-01	.13051E+00	.39337E-01	.15328E+01	06010
.28280E-02	.96884E+00	.21478E-01	.13851E+00	.39254E-01	.15296E+01	06020
.29181E-02	.96790E+00	.22228E-01	.14567E+00	.39246E-01	.15268E+01	06030
.29985E-02	.96704E+00	.22813E-01	.15204E+00	.39199E-01	.15240E+01	06040
.30725E-02	.96622E+00	.23498E-01	.15779E+00	.39240E-01	.15217E+01	06050
.31401E-02	.96547E+00	.23943E-01	.16295E+00	.39205E-01	.15192E+01	06060
.32012E-02	.96478E+00	.24541E-01	.16739E+00	.39297E-01	.15176E+01	06070
.32559E-02	.96422E+00	.24714E-01	.17115E+00	.39246E-01	.15156E+01	06080
.33055E-02	.96371E+00	.25266E-01	.17412E+00	.39416E-01	.15150E+01	06090

.33505E-02	.96338E+00	.25020E-01	.17645E+00	.6263E-01	.15132E+01	06100
.33923E-02	.96305E+00	.25777E-01	.17786E+00	.39661E-01	.15146E+01	06110
.34309E-02	.96307E+00	.24370E-01	.17872E+00	.39070E-01	.15115E+01	06120
.12000E+03	.36703E-02	0.	0.	.36364E-01	.5509E+01	06130
.13767E-04	.12716E-01	.10700E-04	.46172E-02	.36373E-01	.55E+01	06140
.28911E-04	.26537E-01	.47547E-04	.94847E-02	.36383E-01	.56539E+01	06150
.45431E-04	.41431E-01	.11348E-03	.14552E-01	.36391E-01	.57285E+01	06160
.63672E-04	.57672E-01	.21769E-03	.19864E-01	.36405E-01	.58044E+01	06170
.83978E-04	.75520E-01	.36705E-03	.25444E-01	.36410E-01	.58616E+01	06180
.10635E-03	.94526E-01	.57062E-03	.31202E-01	.36429E-01	.59580E+01	06190
.13079E-03	.11584E+00	.83392E-03	.37047E-01	.36433E-01	.60319E+01	06200
.14421E-03	.12722E+00	.99465E-03	.40069E-01	.36442E-01	.60685E+01	06210
.15763E-03	.13852E+00	.11664E-02	.42961E-01	.36446E-01	.61023E+01	06220
.17243E-03	.15090E+00	.13672E-02	.46303E-01	.36455E-01	.61365E+01	06230
.18723E-03	.16320E+00	.15799E-02	.48895E-01	.36460E-01	.61676E+01	06240
.21993E-03	.19008E+00	.20848E-02	.54765E-01	.36482E-01	.62253E+01	06250
.25605E-03	.21940E+00	.26953E-02	.6470E-01	.36490E-01	.62727E+01	06260
.29599E-03	.25137E+00	.34144E-02	.65871E-01	.36513E-01	.63063E+01	06270
.34004E-03	.28617E+00	.42574E-02	.70803E-01	.36521E-01	.63218E+01	06280
.38857E-03	.32400E+00	.52186E-02	.75071E-01	.36545E-01	.63139E+01	06290
.44192E-03	.36504E+00	.63103E-02	.78457E-01	.36552E-01	.62767E+01	06300
.50421E-03	.41232E+00	.75937E-02	.80824E-01	.36574E-01	.61969E+01	06310
.57270E-03	.46335E+00	.90134E-02	.81645E-01	.36576E-01	.60658E+01	06320
.64842E-03	.51934E+00	.10553E-01	.80629E-01	.36589E-01	.58701E+01	06330
.73171E-03	.57961E+00	.12226E-01	.77502E-01	.36579E-01	.55954E+01	06340
.82257E-03	.64390E+00	.14006E-01	.72109E-01	.36574E-01	.52276E+01	06350
.92238E-03	.71231E+00	.15970E-01	.64367E-01	.36542E-01	.47470E+01	06360
.10322E-02	.78381E+00	.18182E-01	.54451E-01	.36505E-01	.41379E+01	06370
.11530E-02	.85553E+00	.20815E-01	.43062E-01	.36434E-01	.34003E+01	06380
.12858E-02	.92053E+00	.23915E-01	.31588E-01	.36338E-01	.25860E+01	06390
.14238E-02	.96394E+00	.26707E-01	.25056E-01	.36169E-01	.19024E+01	06400
.15619E-02	.98001E+00	.27784E-01	.25032E-01	.35951E-01	.15455E+01	06410
.16999E-02	.98050E+00	.27710E-01	.11320E-01	.35718E-01	.14723E+01	06420
.18379E-02	.97898E+00	.27256E-01	.40698E-01	.35435E-01	.14869E+01	06430
.19756E-02	.97909E+00	.27028E-01	.50417E-01	.35181E-01	.14829E+01	06440
.21132E-02	.97863E+00	.27300E-01	.60629E-01	.34904E-01	.14767E+01	06450
.22509E-02	.97813E+00	.27599E-01	.70927E-01	.34645E-01	.14723E+01	06460
.23686E-02	.97760E+00	.28253E-01	.81105E-01	.34397E-01	.14662E+01	05470
.25262E-02	.97692E+00	.28966E-01	.91275E-01	.34155E-01	.14603E+01	06480
.26639E-02	.97617E+00	.29977E-01	.10135E+00	.33953E-01	.14541E+01	06490
.27981E-02	.97532E+00	.31015E-01	.11118E+00	.33748E-01	.14482E+01	06500
.29186E-02	.97448E+00	.32165E-01	.11992E+00	.33621E-01	.14430E+01	06510
.30253E-02	.97365E+00	.33186E-01	.12767E+00	.33491E-01	.14383E+01	06520
						06530

.31216E-02	.9728E+CC	.34251E-01	.13460E+00	.33432E-01	.14342E+01	06540
.32077E-02	.97214E+CC	.35140E-01	.14078E+00	.33350E-01	.14303E+01	06550
.32868E-02	.97143E+CC	.36080E-01	.14638E+00	.33344E-01	.14271E+01	06560
.33591E-02	.97079E+CC	.36777E-01	.15141E+00	.33286E-01	.14238E+01	06570
.34245E-02	.97018E+CC	.37569E-01	.15575E+00	.33176E-01	.14214E+01	06580
.34930E-02	.96970E+CC	.37943E-01	.15944E+00	.33276E-01	.14188E+01	06590
.35360E-02	.96924E+CC	.38622E-01	.16236E+00	.33411E-01	.14177E+01	06600
.35842E-02	.96897E+CC	.38450E-01	.16465E+00	.33257E-01	.14154E+01	06610
.36290E-02	.96863E+CC	.39433E-01	.16600E+00	.33650E-01	.14169E+01	06620
.36701E-02	.96877E+CC	.37627E-01	.16684E+00	.32969E-01	.14126E+01	06630
.13000E+03	.38544E-02					06640
						06650
.14608E-04	.12601E-01	.12007E-04	.40173E-02	.12669E-01	.55093E+01	06660
.30676E-04	.26299E-01	.53621E-04	.82540E-02	.32678E-01	.55782E+01	06670
.48205E-04	.41064E-01	.12811E-03	.12666E-01	.32689E-01	.56493E+01	06680
.67560E-04	.57165E-01	.24615E-03	.17293E-01	.32697E-01	.57216E+01	06690
.89106E-04	.74862E-01	.41560E-03	.22155E-01	.32712E-01	.57953E+01	06700
.11284E-03	.94104E-01	.64714E-03	.27175E-01	.32717E-01	.59702E+01	06710
.13877E-03	.11485E+CC	.94741E-03	.32272E-01	.32737E-01	.59445E+01	06720
.15301E-03	.12613E+CC	.11311E-02	.34908E-01	.32741E-01	.60163E+01	06730
.16726E-03	.13733E+CC	.13278E-02	.37432E-01	.32750E-01	.60518E+01	06740
.18296E-03	.14960E+CC	.15580E-02	.40086E-01	.32754E-01	.60846E+01	06750
.19866E-03	.16179E+CC	.18022E-02	.42611E-01	.32763E-01	.61178E+01	06760
.23336E-03	.18844E+CC	.23840E-02	.47739E-01	.32768E-01	.61480E+01	06770
.27170E-03	.21749E+CC	.30909E-02	.52725E-01	.32790E-01	.62039E+01	06780
.31406E-03	.24915E+CC	.39280E-02	.57451E-01	.32795E-01	.62498E+01	06790
.36081E-03	.28361E+CC	.49163E-02	.61771E-01	.32818E-01	.62821E+01	06800
.41230E-03	.32105E+CC	.60522E-02	.65516E-01	.32821E-01	.62965E+01	06810
.46890E-03	.36165E+CC	.73555E-02	.68497E-01	.32842E-01	.62881E+01	06820
.53500E-03	.40841E+CC	.89063E-02	.70595E-01	.32858E-01	.62509E+01	06830
.60768E-03	.45907E+CC	.10649E-01	.71348E-01	.32858E-01	.61721E+01	06840
.68802E-03	.51422E+CC	.12573E-01	.70501E-01	.32851E-01	.60434E+01	06850
.77639E-03	.57386E+CC	.14708E-01	.67814E-01	.32851E-01	.58517E+01	06860
.87280E-03	.63757E+CC	.17025E-01	.63148E-01	.32826E-01	.55832E+01	06870
.97871E-03	.70555E+CC	.19626E-01	.56420E-01	.32806E-01	.52241E+01	06880
.10952E-02	.77700E+CC	.22566E-01	.47763E-01	.32755E-01	.47547E+01	06890
.12234E-02	.84540E+CC	.26040E-01	.37728E-01	.32698E-01	.41583E+01	06900
.13643E-02	.91641E+CC	.30056E-01	.27749E-01	.32602E-01	.34306E+01	06910
.15108E-02	.96307E+CC	.33817E-01	.21083E-01	.32471E-01	.26128E+01	06920
.16572E-02	.98157E+CC	.35547E-01	.20399E-01	.32264E-01	.19011E+01	06930
.18037E-02	.98260E+CC	.35714E-01	.25452E-01	.31972E-01	.15085E+01	06940
.19501E-02	.98133E+CC	.35388E-01	.33625E-01	.31669E-01	.14161E+01	06950
.20962E-02	.98172E+CC	.35268E-01	.42281E-01	.31171E-01	.14278E+01	06960
.22423E-02	.98151E+CC	.35726E-01	.51485E-01	.31003E-01	.14212E+01	06970
				.30665E-01	.14115E+01	

.23883E-02	.98124E+00	.36221E-01	.60882E-01	.30347E-01	.14048E+01	06980
.25344E-02	.98096E+00	.37114E-01	.70193E-01	.30041E-01	.13963E+01	06590
.26805E-02	.98052E+00	.38097E-01	.79546E-01	.29739E-01	.13883E+01	07000
.28266E-02	.98002E+00	.39398E-01	.88825E-01	.29475E-01	.13802E+01	07010
.29690E-02	.97941E+00	.40758E-01	.97907E-01	.29208E-01	.13726E+01	07020
.30968E-02	.97879E+00	.42196E-01	.10597E+00	.29020E-01	.13660E+01	07030
.32100E-02	.97818E+00	.43504E-01	.11314E+00	.28837E-01	.13601E+01	07040
.33123E-02	.97758E+00	.44808E-01	.11955E+00	.28721E-01	.13550E+01	07050
.34036E-02	.97702E+00	.45937E-01	.12527E+00	.28595E-01	.13504E+01	07060
.34876E-02	.97646E+00	.47061E-01	.13045E+00	.28533E-01	.13463E+01	07070
.35643E-02	.97596E+00	.47953E-01	.13512E+00	.28441E-01	.13424E+01	07080
.36336E-02	.97549E+00	.48866E-01	.13917E+00	.28436E-01	.13393E+01	07090
.36957E-02	.97511E+00	.49380E-01	.14260E+00	.28356E-01	.13361E+01	07100
.37520E-02	.97475E+00	.50124E-01	.14533E+00	.28436E-01	.13344E+01	07110
.38031E-02	.97456E+00	.50008E-01	.14746E+00	.28279E-01	.13317E+01	07120
.38506E-02	.97425E+00	.51153E-01	.14869E+00	.28641E-01	.13331E+01	07130
.38944E-02	.97455E+00	.48703E-01	.14949E+00	.27827E-01	.13269E+01	07140
.14000E+03	.40934E-02	0.	0.	.29852E-01	.55093E+01	07150
0.	0.	0.	0.	.29862E-01	.55736E+01	07160
.15354E-04	.12555E-01	.12974E-04	.33262E-02	.29873E-01	.56460E+01	07170
.32243E-04	.26204E-01	.58173E-04	.68347E-02	.29881E-01	.57166E+01	07180
.50668E-04	.40918E-01	.13905E-03	.10489E-01	.29897E-01	.57827E+01	07190
.71012E-04	.56965E-01	.26748E-03	.14323E-01	.29902E-01	.58419E+01	07200
.93559E-04	.74602E-01	.45199E-03	.18351E-01	.29923E-01	.59345E+01	07210
.11861E-03	.93780E-01	.70453E-03	.22511E-01	.29925E-01	.60048E+01	07220
.14586E-03	.11445E+00	.10326E-02	.26736E-01	.29935E-01	.60395E+01	07230
.16083E-03	.12569E+00	.12336E-02	.28922E-01	.29948E-01	.61040E+01	07240
.17580E-03	.13686E+00	.14490E-02	.31014E-01	.29952E-01	.61334E+01	07250
.19231E-03	.14908E+00	.17014E-02	.33215E-01	.29974E-01	.61879E+01	07260
.20881E-03	.16123E+00	.19696E-02	.35309E-01	.29976E-01	.62324E+01	07270
.24528E-03	.18777E+00	.26095E-02	.39561E-01	.29988E-01	.62633E+01	07280
.28558E-03	.21670E+00	.33897E-02	.43658E-01	.29997E-01	.62765E+01	07290
.33011E-03	.24821E+00	.43169E-02	.47619E-01	.30015E-01	.62671E+01	07300
.37924E-03	.28249E+00	.54169E-02	.51205E-01	.30008E-01	.62290E+01	07310
.43337E-03	.31972E+00	.66881E-02	.54215E-01	.30019E-01	.61497E+01	07320
.49286E-03	.36007E+00	.81574E-02	.56792E-01	.30000E-01	.60212E+01	07330
.56234E-03	.40650E+00	.99204E-02	.58537E-01	.29994E-01	.58307E+01	07340
.63873E-03	.45680E+00	.11924E-01	.59167E-01	.29956E-01	.55647E+01	07350
.72317E-03	.51153E+00	.14164E-01	.58471E-01	.29925E-01	.52100E+01	07360
.81607E-03	.57072E+00	.14585E-01	.56247E-01	.29860E-01	.47471E+01	07370
.91740E-03	.63399E+00	.19462E-01	.52381E-01	.29787E-01	.41588E+01	07380
.10287E-02	.70161E+00	.22620E-01	.46803E-01	.29672E-01	.34386E+01	07390
.11512E-02	.77290E+00	.26213E-01	.39612E-01			07400
.12859E-02	.84561E+00	.30454E-01	.31238E-01			07410

.14341E-02	.91380E+00	.35317E-01	.22803E-01	.29515E-01	.26209E+01	07420
.15280E-02	.96254E+00	.39959E-01	.16950E-01	.29277E-01	.18926E+01	07430
.17419E-02	.98280E+00	.42296E-01	.15988E-01	.28927E-01	.14763E+01	07440
.18958E-02	.98440E+00	.42689E-01	.19901E-01	.28562E-01	.13700E+01	07450
.20498E-02	.98319E+00	.42457E-01	.26647E-01	.28154E-01	.13791E+01	07460
.22033E-02	.98385E+00	.42416E-01	.33926E-01	.27789E-01	.13702E+01	07470
.23568E-02	.98387E+00	.43003E-01	.41752E-01	.27402E-01	.13576E+01	07480
.25104E-02	.98382E+00	.43633E-01	.49835E-01	.27036E-01	.13488E+01	07490
.26639E-02	.98379E+00	.44693E-01	.57870E-01	.26681E-01	.13383E+01	07500
.28175E-02	.98359E+00	.45869E-01	.65981E-01	.26328E-01	.13287E+01	07510
.29710E-02	.98334E+00	.47375E-01	.74040E-01	.26011E-01	.13191E+01	07520
.31207E-02	.98300E+00	.48970E-01	.81949E-01	.25690E-01	.13102E+01	07530
.32551E-02	.98262E+00	.50614E-01	.88975E-01	.25447E-01	.13025E+01	07540
.33740E-02	.98223E+00	.52130E-01	.95228E-01	.25214E-01	.12958E+01	07550
.34815E-02	.98184E+00	.53601E-01	.10082E+00	.25044E-01	.12900E+01	07560
.35775E-02	.98147E+00	.54898E-01	.10581E+00	.24873E-01	.12846E+01	07570
.36658E-02	.98110E+00	.56136E-01	.11033E+00	.24756E-01	.12799E+01	07580
.37464E-02	.98077E+00	.57158E-01	.11441E+00	.24624E-01	.12754E+01	07590
.38193E-02	.98046E+00	.58122E-01	.11795E+00	.24561E-01	.12716E+01	07600
.38846E-02	.98022E+00	.58729E-01	.12094E+00	.24457E-01	.12679E+01	07610
.39437E-02	.97999E+00	.59456E-01	.12334E+00	.24475E-01	.12656E+01	07620
.39974E-02	.97990E+00	.59394E-01	.12519E+00	.24317E-01	.12623E+01	07630
.40473E-02	.97964E+00	.60584E-01	.12625E+00	.24616E-01	.12635E+01	07640
.40934E-02	.98017E+00	.57195E-01	.12700E+00	.23638E-01	.12543E+01	07650
.15000E+03	.42573E-02	0.	0.	.27786E-01	.55093E+01	07660
.15969E-04	.12552E-01	.13652E-04	.25618E-02	.27795E-01	.55754E+01	07670
.33534E-04	.26201E-01	.61399E-04	.52642E-02	.27807E-01	.56437E+01	07680
.52697E-04	.40913E-01	.14680E-03	.80792E-02	.27815E-01	.57132E+01	07690
.73855E-04	.56559E-01	.28258E-03	.11032E-01	.27831E-01	.57841E+01	07710
.97409E-04	.74596E-01	.47774E-03	.14136E-01	.27836E-01	.58562E+01	07720
.12336E-03	.93772E-01	.74516E-03	.17341E-01	.27858E-01	.59277E+01	07730
.15170E-03	.11444E+00	.10929E-02	.20596E-01	.27859E-01	.59968E+01	07740
.16727E-03	.12568E+00	.13061E-02	.22280E-01	.27869E-01	.60309E+01	07750
.18284E-03	.13684E+00	.15349E-02	.23891E-01	.27872E-01	.60625E+01	07760
.20001E-03	.14906E+00	.18031E-02	.25587E-01	.27881E-01	.60943E+01	07770
.21717E-03	.16120E+00	.20882E-02	.27200E-01	.27885E-01	.61232E+01	07780
.25510E-03	.18772E+00	.27696E-02	.30476E-01	.27907E-01	.61765E+01	07790
.29702E-03	.21662E+00	.36022E-02	.33662E-01	.27907E-01	.62198E+01	07800
.34333E-03	.24809E+00	.45941E-02	.36682E-01	.27927E-01	.62495E+01	07810
.39443E-03	.28230E+00	.57750E-02	.39443E-01	.27923E-01	.62615E+01	07820
.45072E-03	.31944E+00	.71449E-02	.41836E-01	.27938E-01	.62507E+01	07830
.51260E-03	.35967E+00	.87365E-02	.43741E-01	.27926E-01	.62114E+01	07840
.58485E-03	.40593E+00	.10650E-01	.45080E-01	.27932E-01	.61309E+01	07850

.66430E-03	.45601E+00	.12858E-01	.45559E-01	.27905E-01	.60013E+01	07860
.75212E-03	.51048E+00	.13341E-01	.45014E-01	.27893E-01	.58104E+01	07870
.84874E-03	.56936E+00	.18165E-01	.43292E-01	.27846E-01	.55448E+01	07880
.95413E-03	.63230E+00	.21308E-01	.40304E-01	.27806E-01	.51917E+01	07890
.10659E-02	.69962E+00	.24919E-01	.35996E-01	.27730E-01	.47321E+01	07900
.11973E-02	.77071E+00	.29051E-01	.30444E-01	.27645E-01	.41488E+01	07910
.13374E-02	.84349E+00	.33935E-01	.23966E-01	.27519E-01	.34340E+01	07920
.14915E-02	.91232E+00	.39516E-01	.17395E-01	.27344E-01	.26181E+01	07930
.16516E-02	.96237E+00	.44898E-01	.12726E-01	.27083E-01	.18808E+01	07940
.18117E-02	.98376E+00	.47754E-01	.11783E-01	.26691E-01	.14496E+01	07950
.19717E-02	.98574E+00	.48350E-01	.14640E-01	.26280E-01	.13340E+01	07960
.21318E-02	.98460E+00	.48195E-01	.19806E-01	.25829E-01	.13411E+01	07970
.22915E-02	.98547E+00	.48216E-01	.25462E-01	.25426E-01	.13302E+01	07980
.24512E-02	.98569E+00	.48891E-01	.31604E-01	.25005E-01	.13153E+01	07990
.26109E-02	.98584E+00	.49610E-01	.38010E-01	.24601E-01	.13049E+01	08000
.27706E-02	.98603E+00	.50778E-01	.44399E-01	.24211E-01	.12930E+01	08010
.29303E-02	.98605E+00	.52081E-01	.50879E-01	.23819E-01	.12820E+01	08020
.30899E-02	.98605E+00	.53720E-01	.57327E-01	.23461E-01	.12714E+01	08030
.32456E-02	.98595E+00	.55469E-01	.63673E-01	.23095E-01	.12615E+01	08040
.33854E-02	.98581E+00	.57245E-01	.69312E-01	.22807E-01	.12531E+01	08050
.35091E-02	.98565E+00	.58392E-01	.74336E-01	.22532E-01	.12457E+01	08060
.36209E-02	.98547E+00	.60461E-01	.78822E-01	.22315E-01	.12392E+01	08070
.37207E-02	.98530E+00	.61855E-01	.82834E-01	.22102E-01	.12334E+01	08080
.38125E-02	.98512E+00	.63147E-01	.86465E-01	.21936E-01	.12281E+01	08090
.38964E-02	.98497E+00	.64231E-01	.89739E-01	.21767E-01	.12230E+01	08100
.39722E-02	.98483E+00	.65191E-01	.92583E-01	.21651E-01	.12186E+01	08110
.40401E-02	.98474E+00	.65837E-01	.94987E-01	.21521E-01	.12144E+01	08120
.41016E-02	.98464E+00	.66495E-01	.96917E-01	.21476E-01	.12113E+01	08130
.41575E-02	.98465E+00	.66485E-01	.98391E-01	.21325E-01	.12077E+01	08140
.42094E-02	.98447E+00	.67536E-01	.99243E-01	.21532E-01	.12080E+01	08150
.42573E-02	.98530E+00	.62932E-01	.99882E-01	.20368E-01	.11950E+01	08160
.16000E+03	.43790E-02	0.	0.	.26371E-01	.55093E+01	08170
.16425E-04	.12572E-01	.14091E-04	.17400E-02	.26380E-01	.55747E+01	08180
.34493E-04	.26241E-01	.63504E-04	.35756E-02	.26392E-01	.56422E+01	08190
.54204E-04	.40977E-01	.15184E-03	.54877E-02	.26400E-01	.57110E+01	08200
.75967E-04	.57049E-01	.29241E-03	.74935E-02	.26416E-01	.57812E+01	08210
.10019E-03	.74713E-01	.49448E-03	.96015E-02	.26421E-01	.58525E+01	08220
.12689E-03	.93519E-01	.77154E-03	.11778E-01	.26441E-01	.59233E+01	08230
.15604E-03	.11462E+00	.11320E-02	.13988E-01	.26444E-01	.59917E+01	08240
.17206E-03	.12587E+00	.13532E-02	.15132E-01	.26453E-01	.60254E+01	08250
.18807E-03	.13705E+00	.15906E-02	.16226E-01	.26456E-01	.60566E+01	08260
.20573E-03	.14928E+00	.18690E-02	.17377E-01	.26465E-01	.60881E+01	08270
.22338E-03	.16143E+00	.21652E-02	.18472E-01	.26468E-01	.61165E+01	08280
						08290

.26239E-03	.18798E+00	.28734E-02	.20696E-01	.26490E-01	.61691E+01	08300
.30551E-03	.21690E+00	.37402E-02	.22858E-01	.26488E-01	.62115E+01	08310
.35314E-03	.24838E+00	.47744E-02	.24906E-01	.26508E-01	.62402E+01	08320
.40571E-03	.29257E+00	.60086E-02	.26778E-01	.26500E-01	.62511E+01	08330
.46360E-03	.31971E+00	.74439E-02	.28400E-01	.26514E-01	.62391E+01	08340
.52725E-03	.35989E+00	.91173E-02	.29688E-01	.26498E-01	.61985E+01	08350
.60158E-03	.40608E+00	.11146E-01	.30591E-01	.26501E-01	.61165E+01	08360
.68329E-03	.45604E+00	.13482E-01	.30908E-01	.26468E-01	.59855E+01	08370
.77363E-03	.51036E+00	.16134E-01	.30529E-01	.26451E-01	.57935E+01	08380
.87101E-03	.56905E+00	.19177E-01	.29349E-01	.26397E-01	.55272E+01	08390
.98141E-03	.63176E+00	.22580E-01	.27310E-01	.26351E-01	.51743E+01	08400
.11005E-02	.69885E+00	.26522E-01	.24377E-01	.26268E-01	.47161E+01	08410
.12315E-02	.76974E+00	.31054E-01	.20599E-01	.26178E-01	.41355E+01	08420
.13756E-02	.84248E+00	.36422E-01	.16191E-01	.26042E-01	.34244E+01	08430
.15341E-02	.91161E+00	.42549E-01	.11704E-01	.25857E-01	.26106E+01	08440
.16988E-02	.96230E+00	.48483E-01	.84724E-02	.25581E-01	.18692E+01	08450
.18635E-02	.98444E+00	.51734E-01	.77477E-02	.25163E-01	.14295E+01	08460
.20281E-02	.98667E+00	.52493E-01	.96154E-02	.24718E-01	.13082E+01	08470
.21928E-02	.98558E+00	.52397E-01	.13103E-01	.24241E-01	.13138E+01	08480
.23570E-02	.98661E+00	.52465E-01	.16964E-01	.23812E-01	.13015E+01	08490
.25213E-02	.98697E+00	.53196E-01	.21187E-01	.23367E-01	.12849E+01	08500
.26855E-02	.98729E+00	.53967E-01	.25626E-01	.22939E-01	.12734E+01	08510
.28498E-02	.98765E+00	.55197E-01	.30066E-01	.22525E-01	.12604E+01	08520
.30140E-02	.98786E+00	.56574E-01	.34587E-01	.22105E-01	.12486E+01	08530
.31783E-02	.98805E+00	.58289E-01	.39091E-01	.21719E-01	.12372E+01	08540
.33384E-02	.98817E+00	.60128E-01	.43536E-01	.21321E-01	.12267E+01	08550
.34822E-02	.98823E+00	.61976E-01	.47485E-01	.21000E-01	.12177E+01	08560
.36095E-02	.98826E+00	.63696E-01	.51008E-01	.20642E-01	.12099E+01	08570
.37244E-02	.98826E+00	.65314E-01	.54151E-01	.20441E-01	.12030E+01	08580
.38271E-02	.98826E+00	.66752E-01	.56963E-01	.20196E-01	.11967E+01	08590
.39215E-02	.98825E+00	.68059E-01	.59508E-01	.19994E-01	.11910E+01	08600
.40078E-02	.98826E+00	.69160E-01	.61801E-01	.19792E-01	.11855E+01	08610
.40858E-02	.98827E+00	.70092E-01	.63795E-01	.19639E-01	.11805E+01	08620
.41556E-02	.98831E+00	.70739E-01	.65474E-01	.19484E-01	.11758E+01	08630
.42188E-02	.98834E+00	.71293E-01	.66832E-01	.19393E-01	.11720E+01	08640
.42763E-02	.98843E+00	.71353E-01	.67854E-01	.19249E-01	.11681E+01	08650
.43297E-02	.98836E+00	.72088E-01	.68461E-01	.19346E-01	.11672E+01	08660
.43790E-01	.98952E+00	.66156E-01	.68938E-01	.18095E-01	.11501E+01	08670
.17000E+03	.44530E-02	0.	0.	.25545E-01	.55093E+01	08680
0.	0.	0.	0.	.25554E-01	.55743E+01	08690
.16703E-04	.12590E-01	.14288E-04	.87558E-03	.25554E-01	.55743E+01	08700
.35076E-04	.26281E-01	.64494E-04	.17995E-02	.25566E-01	.56414E+01	08710
.55120E-04	.41038E-01	.15421E-03	.27622E-02	.25574E-01	.57098E+01	08720
.77251E-04	.57134E-01	.29707E-03	.37724E-02	.25590E-01	.57795E+01	08730

.10189E-03	.74825E+01	.50246E-03	.48346E-02	.25595E-01	.58505E+01	08740
.12903E-03	.94058E+01	.78421E-03	.59316E-02	.25617E-01	.59208E+01	08750
.15868E-03	.11478E+00	.11510E-02	.70463E-02	.25617E-01	.59888E+01	08760
.17496E-03	.12605E+00	.13761E-02	.76230E-02	.25626E-01	.60224E+01	08770
.19125E-03	.13724E+00	.16178E-02	.91753E-02	.25629E-01	.60533E+01	08780
.20921E-03	.14950E+00	.19013E-02	.87564E-02	.25638E-01	.60846E+01	08790
.22716E-03	.16166E+00	.22031E-02	.93091E-02	.25641E-01	.61128E+01	08800
.25683E-03	.18824E+00	.29251E-02	.10432E-01	.25662E-01	.61648E+01	08810
.31068E-03	.21718E+00	.38097E-02	.11525E-01	.25660E-01	.62066E+01	08820
.35911E-03	.24868E+00	.48664E-02	.12560E-01	.25679E-01	.62348E+01	08830
.41256E-03	.28290E+00	.61294E-02	.13507E-01	.25670E-01	.62449E+01	08840
.47144E-03	.32002E+00	.76007E-02	.14328E-01	.25682E-01	.62321E+01	08850
.53617E-03	.36019E+00	.93203E-02	.14981E-01	.25664E-01	.61906E+01	08860
.61175E-03	.40635E+00	.11410E-01	.15438E-01	.25665E-01	.61076E+01	08870
.69484E-03	.45625E+00	.13826E-01	.15599E-01	.25629E-01	.59757E+01	08880
.78671E-03	.51047E+00	.16577E-01	.15407E-01	.25609E-01	.57826E+01	08890
.83776E-03	.56904E+00	.19746E-01	.14809E-01	.25552E-01	.55157E+01	08900
.98000E-03	.63161E+00	.23313E-01	.13776E-01	.25503E-01	.51627E+01	08910
.11191E-02	.69854E+00	.27457E-01	.12290E-01	.25416E-01	.47051E+01	08920
.12523E-02	.76929E+00	.32236E-01	.10377E-01	.25323E-01	.41262E+01	08930
.13989E-02	.84196E+00	.37902E-01	.81461E-02	.25183E-01	.34173E+01	08940
.15601E-02	.91122E+00	.44362E-01	.58730E-02	.24992E-01	.26053E+01	08950
.17275E-02	.96240E+00	.50648E-01	.42266E-02	.24709E-01	.18619E+01	08960
.18950E-02	.98484E+00	.54151E-01	.38406E-02	.24277E-01	.14174E+01	08970
.20624E-02	.98721E+00	.55020E-01	.47644E-02	.23814E-01	.12928E+01	08980
.22299E-02	.98615E+00	.54966E-01	.65181E-02	.23321E-01	.12975E+01	08990
.23969E-02	.98729E+00	.55064E-01	.84711E-02	.22878E-01	.12843E+01	09000
.25639E-02	.98775E+00	.55828E-01	.10620E-01	.22421E-01	.12667E+01	09010
.27309E-02	.98815E+00	.56627E-01	.12890E-01	.21979E-01	.12545E+01	09020
.28980E-02	.98863E+00	.57889E-01	.15166E-01	.21551E-01	.12409E+01	09030
.30650E-02	.98895E+00	.59304E-01	.17490E-01	.21116E-01	.12286E+01	09040
.32326E-02	.98929E+00	.61055E-01	.19808E-01	.20713E-01	.12168E+01	09050
.33949E-02	.98954E+00	.62939E-01	.22100E-01	.20296E-01	.12059E+01	09060
.35410E-02	.98974E+00	.64821E-01	.24136E-01	.19955E-01	.11966E+01	09070
.36705E-02	.98989E+00	.66572E-01	.25954E-01	.19628E-01	.11885E+01	09080
.37874E-02	.99002E+00	.68207E-01	.27575E-01	.19355E-01	.11813E+01	09090
.38918E-02	.99014E+00	.69658E-01	.29026E-01	.19088E-01	.11747E+01	09100
.39878E-02	.99025E+00	.70958E-01	.30338E-01	.18863E-01	.11686E+01	09110
.40755E-02	.99037E+00	.72050E-01	.31520E-01	.18640E-01	.11628E+01	09120
.41549E-02	.99049E+00	.72946E-01	.32548E-01	.18461E-01	.11574E+01	09130
.42259E-02	.99062E+00	.73572E-01	.33415E-01	.18289E-01	.11524E+01	09140
.42902E-02	.99073E+00	.74050E-01	.34113E-01	.18169E-01	.11481E+01	09150
.43486E-02	.99088E+00	.74143E-01	.34636E-01	.18027E-01	.11440E+01	09160
.44029E-02	.99092E+00	.74514E-01	.34955E-01	.18028E-01	.11418E+01	09170

.44530E-02	.59234E+00	.67481E-01	.35211E-01	.16555E-01	.11213E+01	09180
.18000E+03	.44779E-02	0.	0.	.25278E-01	.55093E+01	09190
0.	0.	0.	0.	.25288E-01	.55741E+01	09200
.16796E-04	.12597E-01	.14386E-04	-.22785E-16	.25300E-01	.56411E+01	09210
.35272E-04	.26295E-01	.64953E-04	-.47625E-16	.25307E-01	.57094E+01	09220
.55427E-04	.41061E-01	.15531E-03	-.74483E-16	.25324E-01	.57790E+01	09230
.77682E-04	.57165E-01	.29919E-03	-.10189E-15	.25328E-01	.58498E+01	09240
.10246E-03	.74865E-01	.50605E-03	-.13636E-15	.25350E-01	.59201E+01	09250
.12975E-03	.94109E-01	.78983E-03	-.17191E-15	.25350E-01	.59879E+01	09260
.15956E-03	.11485E+00	.11592E-02	-.21056E-15	.25360E-01	.60214E+01	09270
.17594E-03	.12612E+00	.13860E-02	-.23176E-15	.25362E-01	.60834E+01	09280
.19232E-03	.13732E+00	.16295E-02	-.25297E-15	.25374E-01	.61116E+01	09290
.21037E-03	.14957E+00	.19151E-02	-.27638E-15	.25395E-01	.61634E+01	09300
.22843E-03	.16174E+00	.22192E-02	-.29986E-15	.25411E-01	.62330E+01	09310
.26832E-03	.18833E+00	.29466E-02	-.35204E-15	.25401E-01	.62429E+01	09320
.31241E-03	.21729E+00	.38380E-02	-.41065E-15	.25431E-01	.62298E+01	09330
.36112E-03	.24879E+00	.49030E-02	-.47711E-15	.25394E-01	.61880E+01	09340
.41487E-03	.28302E+00	.61766E-02	-.55341E-15	.25374E-01	.61047E+01	09350
.47407E-03	.32014E+00	.76606E-02	-.64233E-15	.25394E-01	.59724E+01	09360
.53916E-03	.36031E+00	.93962E-02	-.74793E-15	.25337E-01	.57790E+01	09370
.61516E-03	.40646E+00	.11507E-01	-.88501E-15	.25278E-01	.55118E+01	09380
.69872E-03	.45634E+00	.13949E-01	-.10589E-14	.25140E-01	.51587E+01	09390
.79110E-03	.51054E+00	.16734E-01	-.12896E-14	.25045E-01	.47013E+01	09400
.89272E-03	.56507E+00	.19944E-01	-.16094E-14	.24903E-01	.34147E+01	09410
.10036E-02	.63160E+00	.22564E-01	-.20733E-14	.24711E-01	.26031E+01	09420
.11253E-02	.69848E+00	.27775E-01	-.27963E-14	.24425E-01	.18591E+01	09430
.12593E-02	.76918E+00	.32634E-01	-.40190E-14	.23989E-01	.14132E+01	09440
.14067E-02	.84183E+00	.38399E-01	-.63143E-14	.20385E-01	.12100E+01	09450
.15688E-02	.91113E+00	.44971E-01	-.11218E-13	.19961E-01	.11895E+01	09460
.17371E-02	.96242E+00	.51374E-01	-.22401E-13	.19614E-01	.11813E+01	09470
.19055E-02	.98498E+00	.54963E-01	-.47129E-13	.19279E-01	.11740E+01	09480
.20739E-02	.98738E+00	.55869E-01	-.96598E-13	.18724E-01	.11674E+01	09490
.22423E-02	.98634E+00	.55830E-01	-.17284E-12	.20385E-01	.12100E+01	09500
.24103E-02	.98751E+00	.55940E-01	-.26035E-12	.21667E-01	.12482E+01	09510
.25782E-02	.98801E+00	.56714E-01	-.35706E-12	.21234E+01	.12344E+01	09520
.27462E-02	.98844E+00	.57521E-01	-.46073E-12	.20794E-01	.12219E+01	09530
.29141E-02	.98895E+00	.58743E-01	-.56976E-12	.20385E-01	.12100E+01	09540
.30821E-02	.98932E+00	.60218E-01	-.88714E-12	.19961E-01	.11895E+01	09550
.32501E-02	.98970E+00	.61979E-01	-.13071E-12	.19614E-01	.11813E+01	09560
.34138E-02	.99000E+00	.63873E-01	-.94721E-12	.19279E-01	.11740E+01	09570
.35608E-02	.99025E+00	.65764E-01	-.10770E-11	.18998E-01	.11674E+01	09580
.36910E-02	.99045E+00	.67522E-01	-.12019E-11	.18724E-01		09590
.38085E-02	.99063E+00	.69159E-01	-.13223E-11			09600
.39135E-02	.99079E+00	.70608E-01	-.14376E-11			09610

.40101E-02	.99094E+00	.71899E-01	-.15497E-11	.18489E-01	.11611E+01	09620
.40983E-02	.99110E+00	.72982E-01	-.16578E-11	.18258E-01	.11552E+01	09630
.41780E-02	.99126E+00	.73960E-01	-.17592E-11	.18070E-01	.11497E+01	09640
.42494E-02	.99142E+00	.74472E-01	-.18523E-11	.17891E-01	.11445E+01	09650
.43141E-02	.99157E+00	.74919E-01	-.19363E-11	.17761E-01	.11400E+01	09660
.43729E-02	.99173E+00	.75022E-01	-.20103E-11	.17620E-01	.11357E+01	09670
.44275E-02	.99182E+00	.75226E-01	-.20729E-11	.17582E-01	.11330E+01	09680
.44779E-02	.99334E+00	.67750E-01	-.21221E-11	.16059E-01	.11111E+01	09690
.640	.0412					
1						
1	C.	5.5093				
11	C.	5.5093				
19						
1	C.	5.5093				
11	C.	5.5093				

APPENDIX E
OUTPUT FROM TRACY'S CASE

\$INPUT

GAMMA = 0.10E+01.

MINF = 0.0E+01.

THETAG = 0.1E+02.

REINF = 0.1113E+07.

PRINF = 0.75E+00.

ALFA = 9.2E+02.

PINF = 0.1110E+01.

SPROP = 0.2E+01.

MJ = 11.

WK = 53.

ML = 19.

MOD = F.

ITAPE = 0.

\$END

0. 0. 0. 1.7899E+78 .5993E+01
.6036E-05 .1651E-01 .1045E-04 .6504E-60 .4397E+00 .5620E+01
.10357E-04 .3437E-01 .4570E-04 .1352E-67 .1389E+00 .5734E+01
.2296E-04 .9351E-01 .1109E-03 .2100E-67 .1399E+00 .5080E+01
.3161E-04 .7437E-01 .2137E-03 .2802E-67 .1389E+00 .5983E+01
.6703E-04 .9717E-01 .3643E-03 .3761E-67 .1388E+00 .6387E+01
.5281E-04 .1208E+00 .5717E-03 .5519E-67 .1388E+00 .6205E+01
.6494E-04 .1404E+00 .4591E-03 .5523E-67 .1388E+00 .6319E+01
.7161E-04 .1624E+00 .1821E-02 .6057E-67 .1388E+00 .6375E+01
.7027E-04 .1771E+00 .1286E-02 .6080E-67 .1388E+00 .6420E+01
.0562E-04 .1927E+00 .1425E-02 .6979E-67 .1387E+00 .6478E+01
.9297E-04 .2082E+00 .1699E-02 .7418E-67 .1387E+00 .6524E+01
.1092E-03 .2242E+00 .2225E-02 .8274E-67 .1387E+00 .6699E+01
.1271E-03 .2790E+00 .2925E-02 .9825E-67 .1387E+00 .6675E+01

.14699E-03	.31915E+00	-.37731E-02	-.96011E-67	.13060E+00	.67170E+01
.14866E-03	.36269E+00	-.47055E-02	-.99173E-67	.13857E+00	.67240E+01
.19298E-03	.40983E+00	-.59814E-02	-.98762E-67	.13854E+00	.66895E+01
.21945E-03	.46655E+00	-.73607E-02	-.93755E-67	.13864E+00	.65998E+01
.25039E-03	.51856E+00	-.90135E-02	-.82376E-67	.13864E+00	.64308E+01
.28443E-03	.58030E+00	-.10899E-01	-.84199E-67	.13807E+00	.61710E+01
.32200E-03	.64562E+00	-.12801E-01	-.39199E-67	.13870E+00	.58025E+01
.36336E-03	.71305E+00	-.14805E-01	-.94429E-66	.13877E+00	.53154E+01
.40849E-03	.77977E+00	-.16703E-01	.20582E-67	.13883E+00	.47158E+01
.45805E-03	.84234E+00	-.18413E-01	.44132E-67	.13895E+00	.40278E+01
.51257E-03	.89485E+00	-.19914E-01	.53112E-67	.13901E+00	.33245E+01
.57256E-03	.93053E+00	-.21585E-01	.43383E-67	.13901E+00	.27343E+01
.63854E-03	.94669E+00	-.23865E-01	.24874E-67	.13880E+00	.23850E+01
.71707E-03	.94833E+00	-.26083E-01	.11692E-67	.13860E+00	.22954E+01
.77561E-03	.94591E+00	-.30499E-01	.74312E-68	.13811E+00	.23284E+01
.84415E-03	.94419E+00	-.34437E-01	.59732E-68	.13752E+00	.23698E+01
.91268E-03	.94280E+00	-.38344E-01	.50643E-68	.13680E+00	.24021E+01
.98105E-03	.94130E+00	-.42334E-01	.45879E-68	.13600E+00	.24324E+01
.1.494E-02	.93999E+00	-.46323E-01	.45865E-68	.13509E+00	.24416E+01
.11171E-02	.93862E+00	-.50386E-01	.34991E-68	.13403E+00	.24900E+01
.11861E-02	.93723E+00	-.54438E-01	.28583E-68	.13289E+00	.25181E+01
.12545E-02	.93583E+00	-.5858E-01	.22180E-68	.13180E+00	.25457E+01
.13229E-02	.93444E+00	-.62657E-01	.16522E-68	.13055E+00	.25729E+01
.13895E-02	.93309E+00	-.66718E-01	.11896E-68	.12918E+00	.25986E+01
.14491E-02	.93189E+00	-.70331E-01	.84875E-69	.12794E+00	.26208E+01
.15023E-02	.93085E+00	-.73570E-01	.60151E-69	.12672E+00	.26396E+01
.15502E-02	.92998E+00	-.76872E-01	.41966E-69	.12582E+00	.26558E+01
.15929E-02	.92915E+00	-.79099E-01	.28880E-69	.12533E+00	.26693E+01
.16323E-02	.92846E+00	-.81465E-01	.19453E-69	.12566E+00	.26818E+01
.16881E-02	.92789E+00	-.83879E-01	.12980E-69	.12582E+00	.26986E+01
.17006E-02	.92734E+00	-.85610E-01	.87333E-70	.12572E+00	.26986E+01
.17292E-02	.92692E+00	-.87420E-01	.60146E-70	.12882E+00	.27847E+01
.17568E-02	.92656E+00	-.88942E-01	.43429E-70	.12515E+00	.27896E+01
.17799E-02	.92628E+00	-.90405E-01	.30048E-70	.11338E+00	.27129E+01
.18221E-02	.92604E+00	-.91654E-01	.19667E-70	.11884E+00	.27157E+01
.18226E-02	.92580E+00	-.93783E-01	0.	.11781E+00	.27184E+01
.6.	0.	0.	0.	.13688E+00	.55033E+01
.68899E-05	.16426E-01	-.10222E-04	.10524E-02	.13886E+00	.55197E+01
.14465E-04	.34263E-01	-.44701E-04	.21539E-02	.13884E+00	.57333E+01
.22737E-04	.53280E-01	-.12813E-03	.32944E-02	.13882E+00	.58884E+01
.31465E-04	.74002E-01	-.20849E-03	.44769E-02	.13880E+00	.59655E+01
.42023E-04	.96631E-01	-.39715E-03	.57108E-02	.13782E+00	.60841E+01
.53224E-04	.12120E+00	-.56211E-03	.69727E-02	.13575E+00	.62814E+01

65454E-04	14770E+00	8328E-03	92409E-02	13573E+00	63143E+01
72171E-04	16205E+00	10004E-02	86914E-02	13571E+00	63500E+01
78889E-04	17628E+00	11617E-02	95161E-02	13670E+00	64212E+01
86296E-04	19195E+00	1396E-02	10156E-01	13664E+00	64726E+01
93702E-04	20730E+00	16256E-02	10766E-01	13667E+00	65198E+01
11007E-03	24103E+00	2181E-02	11989E-01	13684E+00	65335E+01
12615E-03	27774E+00	2866E-02	13152E-01	13662E+00	66700E+01
14613E-03	31766E+00	3700E-02	14222E-01	13653E+00	67115E+01
17016E-03	36144E+00	4700E-02	15194E-01	13637E+00	67208E+01
19447E-03	40793E+00	5872E-02	15917E-01	13555E+00	66898E+01
22117E-03	45862E+00	7231E-02	16446E-01	13555E+00	65979E+01
25234E-03	51637E+00	8065E-02	17659E-01	13595E+00	64316E+01
28662E-03	57792E+00	1067E-01	16577E-01	13558E+00	61751E+01
32451E-03	64333E+00	1261E-01	16830E-01	13662E+00	58108E+01
36620E-03	71854E+00	1468E-01	17833E-01	13689E+00	53288E+01
41167E-03	77740E+00	1649E-01	13632E-01	13677E+00	47320E+01
46162E-03	84133E+00	1821E-01	11958E-01	13688E+00	40455E+01
51557E-03	89349E+00	1971E-01	18321E-01	13594E+00	33394E+01
57703E-03	92988E+00	2131E-01	92336E-02	13595E+00	27410E+01
64351E-03	94675E+00	2363E-01	92104E-02	13584E+00	23810E+01
71259E-03	94688E+00	2637E-01	18312E-01	13598E+00	22843E+01
78166E-03	94688E+00	3213E-01	11948E-01	13611E+00	21533E+01
85873E-03	94443E+00	3403E-01	13555E-01	13555E+00	23567E+01
91980E-03	94324E+00	3787E-01	13088E-01	13580E+00	23886E+01
93870E-03	94180E+00	4165E-01	16551E-01	13688E+00	24885E+01
10576E-02	94633E+00	4582E-01	17968E-01	13321E+00	24473E+01
11265E-02	94966E+00	4982E-01	19348E-01	13224E+00	24791E+01
11954E-02	93767E+00	5382E-01	20691E-01	13120E+00	25026E+01
12643E-02	93628E+00	5790E-01	22211E-01	13084E+00	25296E+01
13332E-02	93449E+00	6195E-01	23344E-01	12885E+00	25961E+01
14004E-02	93354E+00	6598E-01	24545E-01	12751E+00	25812E+01
14607E-02	93234E+00	6992E-01	25634E-01	12631E+00	26038E+01
15141E-02	93138E+00	7403E-01	26979E-01	12513E+00	26214E+01
15623E-02	93039E+00	7598E-01	27438E-01	12407E+00	26372E+01
16053E-02	92960E+00	7818E-01	28123E-01	12301E+00	26504E+01
16492E-02	92898E+00	8091E-01	28799E-01	12207E+00	26618E+01
16811E-02	92829E+00	8269E-01	29309E-01	12110E+00	26712E+01
17139E-02	92774E+00	8460E-01	29765E-01	12029E+00	26790E+01
17431E-02	92735E+00	8658E-01	30142E-01	11941E+00	26856E+01
17687E-02	92713E+00	8788E-01	30440E-01	11876E+00	26897E+01
17934E-02	92671E+00	8941E-01	30692E-01	11793E+00	26929E+01
18162E-02	92648E+00	9054E-01	30879E-01	11749E+00	26956E+01
18366E-02	92638E+00	9207E-01	31014E-01	11647E+00	26963E+01

0.	7045E-05	0.	16254E-01	0.	13093E+00	55033E+01
14795E-04	33847E-01	-4210E-04	4188E-02	13091E+00	56101E+01	
23250E-04	52730E-01	-13109E-03	6432E-02	13090E+00	57301E+01	
32505E-04	73246E-01	-19726E-03	8706E-02	13088E+00	58435E+01	
42977E-04	95713E-01	-33698E-03	11107E-01	13086E+00	59589E+01	
54425E-04	12006E+00	-53078E-03	13563E-01	13084E+00	60759E+01	
66931E-04	14624E+00	-7866E-03	16032E-01	13081E+00	61915E+01	
73800E-04	16045E+00	-94574E-03	17298E-01	13079E+00	63028E+01	
80670E-04	17455E+00	-11175E-02	18503E-01	13077E+00	64082E+01	
88243E-04	18950E+00	-13210E-02	19761E-01	13075E+00	64990E+01	
95817E-04	20928E+00	-15387E-02	20952E-01	13074E+00	65888E+01	
11255E-03	23072E+00	-17667E-02	23332E-01	13071E+00	65805E+01	
13104E-03	27511E+00	-20667E-02	25599E-01	13069E+00	66543E+01	
15188E-03	31470E+00	-25341E-02	27688E-01	13068E+00	66999E+01	
17442E-03	35771E+00	-44685E-02	29520E-01	13066E+00	67054E+01	
19808E-03	40429E+00	-55917E-02	31086E-01	13064E+00	67311E+01	
22616E-03	45556E+00	-66966E-02	32051E-01	13063E+00	68035E+01	
25004E-03	51194E+00	-86684E-02	32564E-01	13062E+00	68426E+01	
29309E-03	57317E+00	-10221E-01	32359E-01	13060E+00	61768E+01	
33184E-03	63816E+00	-12108E-01	31323E-01	13073E+00	58204E+01	
37446E-03	70553E+00	-14060E-01	29420E-01	13081E+00	53462E+01	
42096E-03	77267E+00	-15931E-01	26722E-01	13089E+00	47578E+01	
47204E-03	83836E+00	-17637E-01	23469E-01	13100E+00	40793E+01	
52833E-03	89605E+00	-19110E-01	20239E-01	13109E+00	33625E+01	
59005E-03	92909E+00	-20666E-01	18015E-01	13112E+00	27470E+01	
65804E-03	94738E+00	-22034E-01	17839E-01	13103E+00	23842E+01	
72867E-03	95010E+00	-25679E-01	19917E-01	13083E+00	22516E+01	
79933E-03	94773E+00	-29100E-01	23133E-01	13041E+00	22781E+01	
86903E-03	94593E+00	-32889E-01	26387E-01	11991E+00	23108E+01	
94056E-03	94455E+00	-36535E-01	29422E-01	12930E+00	23495E+01	
10110E-02	94311E+00	-40454E-01	32374E-01	12860E+00	23779E+01	
10815E-02	94174E+00	-44266E-01	35220E-01	12782E+00	24081E+01	
11519E-02	94037E+00	-48146E-01	37983E-01	12695E+00	24314E+01	
12244E-02	93899E+00	-52306E-01	40678E-01	12602E+00	24572E+01	
12928E-02	93760E+00	-56288E-01	43318E-01	12457E+00	24825E+01	
13633E-02	93621E+00	-59821E-01	45902E-01	12389E+00	25074E+01	
14320E-02	93485E+00	-63675E-01	48376E-01	12270E+00	25309E+01	
14986E-02	93367E+00	-67694E-01	50842E-01	12162E+00	25513E+01	
15462E-02	93261E+00	-70169E-01	52432E-01	12059E+00	25665E+01	
15975E-02	93168E+00	-72900E-01	54086E-01	11959E+00	25834E+01	
16416E-02	93088E+00	-75984E-01	55918E-01	11863E+00	25999E+01	
16821E-02	93018E+00	-77612E-01	56779E-01	11750E+00	26064E+01	

17191E-02	.92956E+09	-.79717E-01	.51972E-01	.1168E+00	.26153E+01
17225E-02	.92964E+00	-.61523E-01	.5791E-01	.11619E+00	.26225E+01
17825E-02	.92881E+00	-.8219E-01	.5997E-01	.11519E+00	.26280E+01
18096E-02	.92866E+00	-.84667E-01	.58153E-01	.11476E+00	.26325E+01
18343E-02	.92797E+00	-.86141E-01	.60637E-01	.11397E+00	.26353E+01
18372E-02	.92779E+00	-.87226E-01	.60996E-01	.11357E+00	.26372E+01
18763E-02	.92757E+00	-.88706E-01	.61267E-01	.11262E+00	.26392E+01
173043E-05	.16039E-01	-.86970E-09	.29881E-02	.12184E+00	.56159E+01
15339E-04	.33405E-01	-.37909E-04	.61136E-02	.12102E+00	.57256E+01
14104E-04	.52149E-01	-.5205E-04	.94773E-02	.12180E+00	.56366E+01
13762E-04	.72316E-01	-.14949E-03	.1214E-01	.12172E+00	.56998E+01
14556E-04	.94503E-01	-.38525E-03	.18227E-01	.12172E+00	.56864E+01
1626E-04	.11056E+00	-.6315E-03	.19012E-01	.12174E+00	.56773E+01
16339E-04	.14443E+00	-.71497E-03	.23273E-01	.12172E+01	.56268E+01
17512E-04	.15846E+00	-.85975E-03	.25276E-01	.12172E+00	.56399E+01
1054E-04	.17242E+00	-.10167E-02	.27349E-01	.12171E+00	.57392E+01
19186E-04	.18767E+00	-.12328E-02	.28931E-01	.12170E+00	.57393E+01
19334E-04	.20281E+00	-.14021E-02	.30621E-01	.12169E+00	.57343E+01
11669E-03	.23587E+00	-.18665E-02	.34111E-01	.12166E+00	.57343E+01
11586E-03	.27127E+00	-.24677E-02	.37437E-01	.12162E+00	.57343E+01
15704E-03	.31105E+00	-.32204E-02	.40504E-01	.12163E+00	.57343E+01
18042E-03	.35332E+00	-.41044E-02	.44311E-01	.12163E+00	.57343E+01
22616E-03	.39976E+00	-.51406E-02	.5393E-01	.12163E+00	.57343E+01
23447E-03	.44957E+00	-.61675E-02	.63946E-01	.12163E+00	.57343E+01
25752E-03	.50649E+00	-.78435E-02	.77228E-01	.12163E+00	.57343E+01
28366E-03	.56731E+00	-.94997E-02	.91438E-01	.12163E+00	.57343E+01
34403E-03	.63241E+00	-.11297E-01	.95979E-01	.12174E+00	.56236E+01
36822E-03	.69933E+00	-.13172E-01	.93216E-01	.12182E+00	.56360E+01
43643E-03	.76678E+00	-.14985E-01	.8981E-01	.12183E+00	.47819E+01
4839E-03	.83141E+00	-.16649E-01	.8428E-01	.12263E+00	.41036E+01
50764E-03	.88780E+00	-.18322E-01	.89517E-01	.12213E+00	.3582E+01
6117E-03	.92811E+00	-.19437E-01	.8594E-01	.12213E+00	.27482E+01
6222E-03	.94844E+00	-.21546E-01	.8507E-01	.12213E+00	.2353E+01
7554E-03	.95216E+00	-.21546E-01	.8507E-01	.12213E+00	.2353E+01
8267E-03	.94987E+00	-.21388E-01	.8276E-01	.1210E+00	.2353E+01
9190E-03	.94603E+00	-.20977E-01	.8756E-01	.12123E+00	.2353E+01
9751E-03	.94665E+00	-.24513E-01	.8213E-01	.12075E+00	.22678E+01
10482E-02	.94323E+00	-.30189E-01	.6599E-01	.12010E+00	.2310E+01
11212E-02	.94385E+00	-.41684E-01	.5074E-01	.1135E+00	.23389E+01
11942E-02	.94245E+00	-.45318E-01	.5466E-01	.1187E+00	.23628E+01
12673E-02	.94112E+00	-.48986E-01	.5887E-01	.1155E+00	.23861E+01
13403E-02	.93972E+00	-.52584E-01	.6281E-01	.1171E+00	.24090E+01

141345-02	930325+00	-562065-01	-666665-01	-116395+00	-243195+01
148465-02	936965+00	-597885-01	703605-01	115285+00	245215+01
154035-02	935745+00	-629555-01	736025-01	113355+00	247115+01
160351-02	934885+00	-658045-01	766205-01	113665+00	248695+01
165625-02	933745+00	-683255-01	788975-01	112685+00	249995+01
170195-02	932935+00	-706235-01	810475-01	111635+00	251105+01
174395-02	932215+00	-729735-01	829415-01	111115+00	252085+01
177425-02	931505+00	-746125-01	845675-01	110345+00	252885+01
181695-02	931655+00	-762795-01	859705-01	109735+00	253495+01
184635-02	930615+00	-778735-01	871285-01	109035+00	253975+01
187615-02	930265+00	-791735-01	883185-01	108545+00	254385+01
190175-02	929975+00	-805625-01	897425-01	107845+00	254605+01
192545-02	929755+00	-819385-01	912275-01	107395+00	254815+01
194735-02	929595+00	-829625-01	896655-01	106645+00	254815+01
0.	0.	0.	0.	110535+00	550935+01
767315-03	187355-01	-729495-02	368745-02	110535+00	561295+01
161135-03	327775-01	-319525-04	785835-02	110515+00	571955+01
253215-04	510605-01	-776035-04	120185-01	110495+00	582745+01
354885-04	709755-01	-150795-03	163585-01	110485+00	593705+01
460065-04	927795-01	-258635-03	208675-01	110475+00	604915+01
592745-04	115425+00	-402785-03	234925-01	110455+00	615785+01
728945-04	141855+00	-608275-03	301485-01	110445+00	626335+01
833755-04	155665+00	-732975-03	326355-01	110435+00	631555+01
878875-04	169375+00	-867855-03	348105-01	110425+00	636385+01
961055-04	184775+00	-102825-02	371085-01	110415+00	641105+01
134355-03	199265+00	-120345-02	394355-01	110405+00	645515+01
122585-03	231795+00	-162005-02	439455-01	110395+00	653475+01
342725-03	267225+00	-216345-02	482495-01	110385+00	659975+01
164975-03	305605+00	-278475-02	522245-01	110375+00	663815+01
139525-03	347735+00	-356295-02	557285-01	110375+00	664865+01
216575-03	393215+00	-448845-02	587935-01	110375+00	662085+01
246315-03	442355+00	-557665-02	606485-01	110395+00	658335+01
281035-03	498565+00	-692605-02	617045-01	110415+00	635535+01
319205-03	598795+00	-841315-02	614135-01	110475+00	616335+01
361405-03	622975+00	-130685-01	595725-01	110525+00	593145+01
307825-03	696115+00	-118205-01	560555-01	110615+00	530455+01
558475-03	797905+00	-139425-01	583915-01	110715+00	682135+01
5164105-03	823695+00	-151375-01	646045-01	110855+00	415235+01
375295-03	882185+00	-165055-01	673555-01	110955+00	342805+01
642625-03	925985+00	-178235-01	927745-01	111035+00	276275+01
716675-03	949465+00	-196075-01	312235-01	111025+00	230625+01
793595-03	9544635+00	-219945-01	342605-01	110955+00	213715+01
470515-03	952765+00	-248602-01	401485-01	110735+00	214415+01
347435-03	950005+00	-281625-01	464535-01	110405+00	218205+01

.1024E-02	.9494E+00	-.3140E-01	.52418E-01	.11002E+00	.22062E+01
.1101E-02	.94007E+00	-.34679E-01	.50212E-01	.11957E+00	.22315E+01
.1178E-02	.94670E+00	-.37934E-01	.48339E-01	.10379E+00	.22975E+01
.12545E-02	.94535E+00	-.41224E-01	.46248E-01	.10552E+00	.22745E+01
.1331E-02	.94392E+00	-.44403E-01	.44253E-01	.11795E+00	.22940E+01
.1408E-02	.94250E+00	-.47748E-01	.42399E-01	.11720E+00	.23140E+01
.14847E-02	.94118E+00	-.51022E-01	.40557E-01	.10650E+00	.23340E+01
.15596E-02	.93980E+00	-.54230E-01	.38752E-01	.10543E+00	.23522E+01
.16367E-02	.93837E+00	-.57491E-01	.36952E-01	.10534E+00	.23688E+01
.17139E-02	.93692E+00	-.60753E-01	.35104E-01	.11343E+00	.23812E+01
.17978E-02	.93548E+00	-.64025E-01	.33204E-01	.10383E+00	.23927E+01
.18722E-02	.93404E+00	-.67297E-01	.31304E-01	.10383E+00	.24033E+01
.19473E-02	.93260E+00	-.70569E-01	.29404E-01	.10383E+00	.24139E+01
.19978E-02	.93260E+00	-.71445E-01	.28611E+00	.10383E+00	.24245E+01
.20278E-02	.93260E+00	-.72710E-01	.27818E+00	.10383E+00	.24351E+01
.20456E-02	.93227E+00	-.73541E-01	.27025E+00	.10383E+00	.24457E+01
.20456E-02	.93227E+00	-.74895E-01	.26232E+00	.10383E+00	.24563E+01
.20456E-02	.93227E+00	-.76249E-01	.25439E+00	.10383E+00	.24669E+01
.20456E-02	.93227E+00	-.77603E-01	.24646E+00	.10383E+00	.24775E+01
.20456E-02	.93227E+00	-.78957E-01	.23853E+00	.10383E+00	.24881E+01
.20456E-02	.93227E+00	-.80311E-01	.23060E+00	.10383E+00	.24987E+01
.20456E-02	.93227E+00	-.81665E-01	.22267E+00	.10383E+00	.25093E+01
.20456E-02	.93227E+00	-.83019E-01	.21474E+00	.10383E+00	.25199E+01
.20456E-02	.93227E+00	-.84373E-01	.20681E+00	.10383E+00	.25305E+01
.20456E-02	.93227E+00	-.85727E-01	.19888E+00	.10383E+00	.25411E+01
.20456E-02	.93227E+00	-.87081E-01	.19095E+00	.10383E+00	.25517E+01
.20456E-02	.93227E+00	-.88435E-01	.18302E+00	.10383E+00	.25623E+01
.20456E-02	.93227E+00	-.89789E-01	.17509E+00	.10383E+00	.25729E+01
.20456E-02	.93227E+00	-.91143E-01	.16716E+00	.10383E+00	.25835E+01
.20456E-02	.93227E+00	-.92497E-01	.15923E+00	.10383E+00	.25941E+01
.20456E-02	.93227E+00	-.93851E-01	.15130E+00	.10383E+00	.26047E+01
.20456E-02	.93227E+00	-.95205E-01	.14337E+00	.10383E+00	.26153E+01
.20456E-02	.93227E+00	-.96559E-01	.13544E+00	.10383E+00	.26259E+01
.20456E-02	.93227E+00	-.97913E-01	.12751E+00	.10383E+00	.26365E+01
.20456E-02	.93227E+00	-.99267E-01	.11958E+00	.10383E+00	.26471E+01
.20456E-02	.93227E+00	-.100621E-01	.11165E+00	.10383E+00	.26577E+01
.20456E-02	.93227E+00	-.101975E-01	.10372E+00	.10383E+00	.26683E+01
.20456E-02	.93227E+00	-.103329E-01	.9579E+00	.10383E+00	.26789E+01
.20456E-02	.93227E+00	-.104683E-01	.8781E+00	.10383E+00	.26895E+01
.20456E-02	.93227E+00	-.106037E-01	.7983E+00	.10383E+00	.27001E+01
.20456E-02	.93227E+00	-.107391E-01	.7185E+00	.10383E+00	.27107E+01
.20456E-02	.93227E+00	-.108745E-01	.6387E+00	.10383E+00	.27213E+01
.20456E-02	.93227E+00	-.110099E-01	.5589E+00	.10383E+00	.27319E+01
.20456E-02	.93227E+00	-.111453E-01	.4791E+00	.10383E+00	.27425E+01
.20456E-02	.93227E+00	-.112807E-01	.3993E+00	.10383E+00	.27531E+01
.20456E-02	.93227E+00	-.114161E-01	.3195E+00	.10383E+00	.27637E+01
.20456E-02	.93227E+00	-.115515E-01	.2397E+00	.10383E+00	.27743E+01
.20456E-02	.93227E+00	-.116869E-01	.1599E+00	.10383E+00	.27849E+01
.20456E-02	.93227E+00	-.118223E-01	.798E+00	.10383E+00	.27955E+01
.20456E-02	.93227E+00	-.119577E-01	.198E+00	.10383E+00	.28061E+01
.20456E-02	.93227E+00	-.120931E-01	.98E+00	.10383E+00	.28167E+01
.20456E-02	.93227E+00	-.122285E-01	.0E+00	.10383E+00	.28273E+01
.20456E-02	.93227E+00	-.123639E-01	.0E+00	.10383E+00	.28379E+01
.20456E-02	.93227E+00	-.124993E-01	.0E+00	.10383E+00	.28485E+01
.20456E-02	.93227E+00	-.126347E-01	.0E+00	.10383E+00	.28591E+01
.20456E-02	.93227E+00	-.127701E-01	.0E+00	.10383E+00	.28697E+01
.20456E-02	.93227E+00	-.129055E-01	.0E+00	.10383E+00	.28803E+01
.20456E-02	.93227E+00	-.130409E-01	.0E+00	.10383E+00	.28909E+01
.20456E-02	.93227E+00	-.131763E-01	.0E+00	.10383E+00	.29015E+01
.20456E-02	.93227E+00	-.133117E-01	.0E+00	.10383E+00	.29121E+01
.20456E-02	.93227E+00	-.134471E-01	.0E+00	.10383E+00	.29227E+01
.20456E-02	.93227E+00	-.135825E-01	.0E+00	.10383E+00	.29333E+01
.20456E-02	.93227E+00	-.137179E-01	.0E+00	.10383E+00	.29439E+01
.20456E-02	.93227E+00	-.138533E-01	.0E+00	.10383E+00	.29545E+01
.20456E-02	.93227E+00	-.139887E-01	.0E+00	.10383E+00	.29651E+01
.20456E-02	.93227E+00	-.141241E-01	.0E+00	.10383E+00	.29757E+01
.20456E-02	.93227E+00	-.142595E-01	.0E+00	.10383E+00	.29863E+01
.20456E-02	.93227E+00	-.143949E-01	.0E+00	.10383E+00	.29969E+01
.20456E-02	.93227E+00	-.145303E-01	.0E+00	.10383E+00	.30075E+01
.20456E-02	.93227E+00	-.146657E-01	.0E+00	.10383E+00	.30181E+01
.20456E-02	.93227E+00	-.148011E-01	.0E+00	.10383E+00	.30287E+01
.20456E-02	.93227E+00	-.149365E-01	.0E+00	.10383E+00	.30393E+01
.20456E-02	.93227E+00	-.150719E-01	.0E+00	.10383E+00	.30499E+01
.20456E-02	.93227E+00	-.152073E-01	.0E+00	.10383E+00	.30605E+01
.20456E-02	.93227E+00	-.153427E-01	.0E+00	.10383E+00	.30711E+01
.20456E-02	.93227E+00	-.154781E-01	.0E+00	.10383E+00	.30817E+01
.20456E-02	.93227E+00	-.156135E-01	.0E+00	.10383E+00	.30923E+01
.20456E-02	.93227E+00	-.157489E-01	.0E+00	.10383E+00	.31029E+01
.20456E-02	.93227E+00	-.158843E-01	.0E+00	.10383E+00	.31135E+01
.20456E-02	.93227E+00	-.160197E-01	.0E+00	.10383E+00	.31241E+01
.20456E-02	.93227E+00	-.161551E-01	.0E+00	.10383E+00	.31347E+01
.20456E-02	.93227E+00	-.162905E-01	.0E+00	.10383E+00	.31453E+01
.20456E-02	.93227E+00	-.164259E-01	.0E+00	.10383E+00	.31559E+01
.20456E-02	.93227E+00	-.165613E-01	.0E+00	.10383E+00	.31665E+01
.20456E-02	.93227E+00	-.166967E-01	.0E+00	.10383E+00	.31771E+01
.20456E-02	.93227E+00	-.168321E-01	.0E+00	.10383E+00	.31877E+01
.20456E-02	.93227E+00	-.169675E-01	.0E+00	.10383E+00	.31983E+01
.20456E-02	.93227E+00	-.171029E-01	.0E+00	.10383E+00	.32089E+01
.20456E-02	.93227E+00	-.172383E-01	.0E+00	.10383E+00	.32195E+01
.20456E-02	.93227E+00	-.173737E-01	.0E+00	.10383E+00	.32301E+01
.20456E-02	.93227E+00	-.175091E-01	.0E+00	.10383E+00	.32407E+01
.20456E-02	.93227E+00	-.176445E-01	.0E+00	.10383E+00	.32513E+01
.20456E-02	.93227E+00	-.177799E-01	.0E+00	.10383E+00	.32619E+01
.20456E-02	.93227E+00	-.179153E-01	.0E+00	.10383E+00	.32725E+01
.20456E-02	.93227E+00	-.180507E-01	.0E+00	.10383E+00	.32831E+01
.20456E-02	.93227E+00	-.181861E-01	.0E+00	.10383E+00	.32937E+01
.20456E-02	.93227E+00	-.183215E-01	.0E+00	.10383E+00	.33043E+01
.20456E-02	.93227E+00	-.184569E-01	.0E+00	.10383E+00	.33149E+01
.20456E-02	.93227E+00	-.185923E-01	.0E+00	.10383E+00	.33255E+01
.20456E-02	.93227E+00	-.187277E-01	.0E+00	.10383E+00	.33361E+01
.20456E-02	.93227E+00	-.188631E-01	.0E+00	.10383E+00	.33467E+01
.20456E-02	.93227E+00	-.190085E-01	.0E+00	.10383E+00	.33573E+01
.20456E-02	.93227E+00	-.191439E-01	.0E+00	.10383E+00	.33679E+01
.20456E-02	.93227E+00	-.192793E-01	.0E+00	.10383E+00	.33785E+01
.20456E-02	.93227E+00	-.194147E-01	.0E+00	.10383E+00	.33891E+01
.20456E-02	.93227E+00	-.195501E-01	.0E+00	.10383E+00	.33997E+01
.20456E-02	.93227E+00	-.196855E-01	.0E+00	.10383E+00	.34103E+01
.20456E-02	.93227E+00	-.198209E-01	.0E+00	.10383E+00	.34209E+01
.20456E-02	.93227E+00	-.199563E-01	.0E+00	.10383E+00	.34315E+01
.20456E-02	.93227E+00	-.200917E-01	.0E+00	.10383E+00	.34421E+01
.20456E-02	.93227E+00	-.202271E-01	.0E+00	.10383E+00	.34527E+01
.20456E-02	.93227E+00	-.203625E-01	.0E+00	.10383E+00	.34633E+01
.20456E-02	.93227E+00	-.204979E-01	.0E+00	.10383E+00	.34739E+01
.20456E-02	.93227E+00	-.206333E-01	.0E+00	.10383E+00	.34845E+01
.20456E-02	.93227E+00	-.207687E-01	.0E+00	.10383E+00	.34951E+01
.20456E-02	.93227E+00	-.209041E-01	.0E+00	.10383E+00	.35057E+01
.20456E-02	.93227E+00	-.210395E-01	.0E+00	.10383E+00	.35163E+01
.20456E-02	.93227E+00	-.211749E-01	.0E+00	.10383E+00	.35269E+01
.20456E-02	.93227E+00	-.213103E-01	.0E+00	.10383E+00	.35375E+01
.20456E-02	.93227E+00	-.214457E-01	.0E+00	.10383E+00	.35481E+01
.20456E-02	.93227E+00	-.215811E-01	.0E+00	.10383E+00	.35587E+01
.20456E-02	.93227E+00	-.217165E-01	.0E+00	.10383E+00	.35693E+01
.20456E-02	.93227E+00	-.218519E-01	.0E+00	.10383E+00	.35799E+01
.20456E-02	.93227E+00	-.219873E-01	.0E+00	.10383E+00	.35905E+01
.20456E-02	.93227E+00	-.221227E-01	.0E+00	.10383E+00	.36011E+01
.20456E-02	.93227E+00	-.222581E-01	.0E+00	.10383E+00	.36117E+01
.20456E-02	.93227E+00	-.223935E-01	.0E+00	.10383E+00	.36223E+01
.20456E-02	.93227E+00	-.225289E-01	.0E+00	.10383E+00	.36329E+01
.20456E-02	.93227E+00	-.226643E-01	.0E+00	.10383E+00	.36435E+01
.20456E-02	.93227E+00	-.227997E-01	.0E+00	.10383E+00	.36541E+01
.20456E-02	.93227E+00	-.229351E-01	.0E+00	.10383E+00	.36647E+01
.20456E-02	.93227E+00	-.230705E-01	.0E+00	.10383E+00	.36753E+01
.20456E-02	.93227E+00	-.232059E-01	.0E+00	.10383E+00	.36859E+01
.20456E-02	.93227E+00	-.233413E-01	.0E+00	.10383E+00	.36965E+01
.20456E-02	.93227E+00	-.234767E-01	.0E+00	.10383E+00	.37071E+01
.20456E-02	.93227E+00	-.236121E-01	.0E+00	.10383E+00	.37177E+01
.20456E-02	.93227E+00	-.237475E-01	.0E+00	.10383E+00	.37283E+01
.20456E-02	.93227E+00	-.238829E-01	.0E+00	.10383E+00	.37389E+01
.20456E-02	.93227E+00	-.240183E-01	.0E+00	.10383E+00	.37495E+01
.20456E-02	.93227E+00	-.241537E-01	.0E+00	.10383E+00	.37601E+01
.20456E-02	.93227E				

54507E-03	51309E+00	-12077E-01	53740E-01	98515E-01	42210E+01
51107E-03	87429E+00	-14240E-01	45400E-01	98550E-01	34943E+01
66259E-03	92224E+00	-15370E-01	38410E-01	98733E-01	27970E+01
70124E-03	95002E+00	-16063E-01	35470E-01	98780E-01	22852E+01
84296E-03	95733E+00	-16933E-01	38177E-01	98776E-01	20683E+01
92465E-03	95424E+00	-17389E-01	38177E-01	98809E-01	20364E+01
10081E-02	95418E+00	-17431E-01	52587E-01	98810E-01	20321E+01
10881E-02	95251E+00	-17202E-01	59893E-01	98874E-01	21160E+01
11695E-02	95153E+00	-17002E-01	67918E-01	98894E-01	21353E+01
12511E-02	95017E+00	-16291E-01	73918E-01	98726E-01	21543E+01
13325E-02	94833E+00	-15762E-01	80627E-01	97115E-01	21725E+01
14141E-02	94745E+00	-15097E-01	87174E-01	96734E-01	21894E+01
14956E-02	94602E+00	-14414E-01	93607E-01	96246E-01	22058E+01
15771E-02	94466E+00	-13619E-01	99913E-01	95892E-01	22217E+01
16585E-02	94327E+00	-12835E-01	10898E+00	95243E-01	22365E+01
17391E-02	94201E+00	-11918E-01	11131E+00	94793E-01	22496E+01
18205E-02	94090E+00	-10975E-01	11599E+00	94282E-01	22603E+01
19019E-02	93981E+00	-9932E-01	12009E+00	93876E-01	22696E+01
19833E-02	93883E+00	-8885E-01	12380E+00	93403E-01	22775E+01
20647E-02	93795E+00	-7838E-01	12685E+00	93019E-01	22839E+01
21461E-02	93707E+00	-6791E-01	12963E+00	92675E-01	22892E+01
22275E-02	93620E+00	-5744E-01	13247E+00	92364E-01	22934E+01
23089E-02	93532E+00	-4697E-01	13530E+00	92051E-01	22967E+01
23903E-02	93444E+00	-3650E-01	13813E+00	91738E-01	22993E+01
24717E-02	93356E+00	-2603E-01	14096E+00	91425E-01	23004E+01
25531E-02	93268E+00	-1556E-01	14379E+00	91112E-01	23018E+01
26345E-02	93180E+00	-509E-01	14662E+00	90799E-01	23029E+01
27159E-02	93092E+00	0	14945E+00	90486E-01	23039E+01
27973E-02	93004E+00	11920E-05	15160E-02	85833E-01	23049E+01
28787E-02	92916E+00	14940E-01	15375E-01	85833E-01	23059E+01
29601E-02	92828E+00	17960E-01	15590E-01	85833E-01	23069E+01
30415E-02	92740E+00	20980E-01	15805E-01	85833E-01	23079E+01
31229E-02	92652E+00	23990E-01	16020E-01	85833E-01	23089E+01
32043E-02	92564E+00	27010E-01	16235E-01	85833E-01	23099E+01
32857E-02	92476E+00	30030E-01	16450E-01	85833E-01	23109E+01
33671E-02	92388E+00	33050E-01	16665E-01	85833E-01	23119E+01
34485E-02	92300E+00	36070E-01	16880E-01	85833E-01	23129E+01
35299E-02	92212E+00	39090E-01	17095E-01	85833E-01	23139E+01
36113E-02	92124E+00	42110E-01	17310E-01	85833E-01	23149E+01
36927E-02	92036E+00	45130E-01	17525E-01	85833E-01	23159E+01
37741E-02	91948E+00	48150E-01	17740E-01	85833E-01	23169E+01
38555E-02	91860E+00	51170E-01	17955E-01	85833E-01	23179E+01
39369E-02	91772E+00	54190E-01	18170E-01	85833E-01	23189E+01
40183E-02	91684E+00	57210E-01	18385E-01	85833E-01	23199E+01
40997E-02	91596E+00	60230E-01	18600E-01	85833E-01	23209E+01
41811E-02	91508E+00	63250E-01	18815E-01	85833E-01	23219E+01
42625E-02	91420E+00	66270E-01	19030E-01	85833E-01	23229E+01
43439E-02	91332E+00	69290E-01	19245E-01	85833E-01	23239E+01
44253E-02	91244E+00	72310E-01	19460E-01	85833E-01	23249E+01
45067E-02	91156E+00	75330E-01	19675E-01	85833E-01	23259E+01
45881E-02	91068E+00	78350E-01	19890E-01	85833E-01	23269E+01
46695E-02	90980E+00	81370E-01	20105E-01	85833E-01	23279E+01
47509E-02	90892E+00	84390E-01	20320E-01	85833E-01	23289E+01
48323E-02	90804E+00	87410E-01	20535E-01	85833E-01	23299E+01
49137E-02	90716E+00	90430E-01	20750E-01	85833E-01	23309E+01
49951E-02	90628E+00	93450E-01	20965E-01	85833E-01	23319E+01
50765E-02	90540E+00	96470E-01	21180E-01	85833E-01	23329E+01
51579E-02	90452E+00	99490E-01	21395E-01	85833E-01	23339E+01
52393E-02	90364E+00	102510E-01	21610E-01	85833E-01	23349E+01
53207E-02	90276E+00	105530E-01	21825E-01	85833E-01	23359E+01
54021E-02	90188E+00	108550E-01	22040E-01	85833E-01	23369E+01
54835E-02	90100E+00	111570E-01	22255E-01	85833E-01	23379E+01
55649E-02	90012E+00	114590E-01	22470E-01	85833E-01	23389E+01
56463E-02	89924E+00	117610E-01	22685E-01	85833E-01	23399E+01
57277E-02	89836E+00	120630E-01	22900E-01	85833E-01	23409E+01
58091E-02	89748E+00	123650E-01	23115E-01	85833E-01	23419E+01
58905E-02	89660E+00	126670E-01	23330E-01	85833E-01	23429E+01
59719E-02	89572E+00	129690E-01	23545E-01	85833E-01	23439E+01
60533E-02	89484E+00	132710E-01	23760E-01	85833E-01	23449E+01
61347E-02	89396E+00	135730E-01	23975E-01	85833E-01	23459E+01
62161E-02	89308E+00	138750E-01	24190E-01	85833E-01	23469E+01
62975E-02	89220E+00	141770E-01	24405E-01	85833E-01	23479E+01
63789E-02	89132E+00	144790E-01	24620E-01	85833E-01	23489E+01
64603E-02	89044E+00	147810E-01	24835E-01	85833E-01	23499E+01
65417E-02	88956E+00	150830E-01	25050E-01	85833E-01	23509E+01
66231E-02	88868E+00	153850E-01	25265E-01	85833E-01	23519E+01
67045E-02	88780E+00	156870E-01	25480E-01	85833E-01	23529E+01
67859E-02	88692E+00	159890E-01	25695E-01	85833E-01	23539E+01
68673E-02	88604E+00	162910E-01	25910E-01	85833E-01	23549E+01
69487E-02	88516E+00	165930E-01	26125E-01	85833E-01	23559E+01
70301E-02	88428E+00	168950E-01	26340E-01	85833E-01	23569E+01
71115E-02	88340E+00	171970E-01	26555E-01	85833E-01	23579E+01
71929E-02	88252E+00	174990E-01	26770E-01	85833E-01	23589E+01
72743E-02	88164E+00	178010E-01	26985E-01	85833E-01	23599E+01
73557E-02	88076E+00	181030E-01	27200E-01	85833E-01	23609E+01
74371E-02	87988E+00	184050E-01	27415E-01	85833E-01	23619E+01
75185E-02	87900E+00	187070E-01	27630E-01	85833E-01	23629E+01
75999E-02	87812E+00	190090E-01	27845E-01	85833E-01	23639E+01
76813E-02	87724E+00	193110E-01	28060E-01	85833E-01	23649E+01
77627E-02	87636E+00	196130E-01	28275E-01	85833E-01	23659E+01
78441E-02	87548E+00	199150E-01	28490E-01	85833E-01	23669E+01
79255E-02	87460E+00	202170E-01	28705E-01	85833E-01	23679E+01
80069E-02	87372E+00	205190E-01	28920E-01	85833E-01	23689E+01
80883E-02	87284E+00	208210E-01	29135E-01	85833E-01	23699E+01
81697E-02	87196E+00	211230E-01	29350E-01	85833E-01	23709E+01
82511E-02	87108E+00	214250E-01	29565E-01	85833E-01	23719E+01
83325E-02	87020E+00	217270E-01	29780E-01	85833E-01	23729E+01
84139E-02	86932E+00	220290E-01	29995E-01	85833E-01	23739E+01
84953E-02	86844E+00	223310E-01	30210E-01	85833E-01	23749E+01
85767E-02	86756E+00	226330E-01	30425E-01	85833E-01	23759E+01
86581E-02	86668E+00	229350E-01	30640E-01	85833E-01	23769E+01
87395E-02	86580E+00	232370E-01	30855E-01	85833E-01	23779E+01
88209E-02	86492E+00	235390E-01	31070E-01	85833E-01	23789E+01
89023E-02	86404E+00	238410E-01	31285E-01	85833E-01	23799E+01
89837E-02	86316E+00	241430E-01	31500E-01	85833E-01	23809E+01
90651E-02	86228E+00	244450E-01	31715E-01	85833E-01	23819E+01
91465E-02	86140E+00	247470E-01	31930E-01	85833E-01	23829E+01
92279E-02	86052E+00	250490E-01	32145E-01	85833E-01	23839E+01
93093E-02	85964E+00	253510E-01	32360E-01	85833E-01	23849E+01
93907E-02	85876E+00	256530E-01	32575E-01	85833E-01	23859E+01
94721E-02	85788E+00	259550E-01	32790E-01	85833E-01	23869E+01
95535E-02	85700E+00	262570E-01	33005E-01	85833E-01	23879E+01
96349E-02	85612E+00	265590E-01	33220E-01	85833E-01	23889E+01
97163E-02	85524E+00	268610E-01	33435E-01	85833E-01	23899E+01
97977E-02	85436E+00	271630E-01	33650E-01	85833E-01	23909E+01
98791E-02	85348E+00	274650E-01	33865E-01	85833E-01	23919E+01
99605E-02	85260E+00	277670E-01	34080E-01	85833E-01	23929E+01
100419E-02	85172E+00	280690E-01	34295E-01	85833E-01	23939E+01
101233E-02	85084E+00	283710E-01	34510E-01	85833E-01	23949E+01
102047E-02	85000E+00	286730E-01	34725E-01	85833E-01	23959E+01
102861E-02	84912E+00	289750E-01	34940E-01	85833E-01	23969E+01
103675E-02	84824E+00	292770E-01	35155E-01	85833E-01	23979E+01
104489E-02	84736E+00	295790E-01	35370E-01	85833E-01	23989E+01
105303E-02	84648E+00	298810E-01	35585E-01	85833E-01	23999E+01
106117E-02	84560E+00	301830E-01	35800E-01	85833E-01	24009E+01
106931E-02	84472E+00	304850E-01	36015E-01	85833E-01	24019E+01
107745E-02	84384E+00	307870E-01	36230E-01	85833E-01	24029E+01
108559E-02	84296E+00	310890E-01	36445E-01	85833E-01	24039E+01
109373E-02	84208E+00	313910E-01	36660E-01	85833E-01	24049E+01
110187E-02	84120E+00	316930E-01	36875E-01	85833E-01	24059E+01
111001E-02	84032E+00	319950E-01	37090E-01	85833E-01	24069E+01
111815E-02	83944E+00	322970E-01	37305E-01	85833E-01	24079E+01
112629E-02	83856E+00	325990E-01	37520E-01	85833E-01	24089E+01
113443E-02	83768E+00	329010E-01	37735E-01	85833E-01	24099E+01
114257E-02	83680E+00	332030E-01	37950E-01	85833E-01	24109E+01
115071E-02	83592E+00	335050E-01	38165E-01	85833E-01	24119E+01
115885E-02	83504E+00	338070E-01	38380E-01	85833E-01	24129E+01
116699E-02	83416E+00	341090E-01	38595E-01	85833E-01	

.2+60E-03	.37527E+00	.24991E-02	.79239E-01	.55633E-01	.65449E+01
.2803E-03	.42249E+00	.31782E-02	.82161E-01	.6563E-01	.64405E+01
.3199E-03	.47006E+00	.40381E-02	.8357E-01	.85703E-01	.63931E+01
.3634E-03	.53492E+00	.5024E-02	.8377E-01	.8570E-01	.61512E+01
.4115E-03	.59754E+00	.62150E-02	.8156E-01	.85827E-01	.50574E+01
.4649E-03	.66373E+00	.75032E-02	.77387E-01	.8331E-01	.59863E+01
.5223E-03	.73182E+00	.89321E-02	.7023E-01	.85812E-01	.49400E+01
.5853E-03	.79997E+00	.10116E-01	.6159E-01	.8512E-01	.43058E+01
.6559E-03	.86393E+00	.11213E-01	.5175E-01	.8524E-01	.35817E+01
.7311E-03	.91654E+00	.12120E-01	.4289E-01	.8634E-01	.28446E+01
.8160E-03	.94963E+00	.13232E-01	.38110E-01	.8640E-01	.22031E+01
.9024E-03	.96099E+00	.14520E-01	.3486E-01	.8643E-01	.1702E+01
.9912E-03	.96026E+00	.1632E-01	.328E-01	.8639E-01	.13621E+01
.1078E-02	.95800E+00	.1834E-01	.3171E-01	.8623E-01	.10947E+01
.1168E-02	.95678E+00	.2108E-01	.3128E-01	.8612E-01	.8610E+01
.1253E-02	.95547E+00	.2425E-01	.3128E-01	.8587E-01	.6533E+01
.1341E-02	.95412E+00	.2862E-01	.3128E-01	.8569E-01	.4569E+01
.1428E-02	.95281E+00	.3394E-01	.3128E-01	.8547E-01	.2829E+01
.1515E-02	.95146E+00	.4037E-01	.3128E-01	.8513E-01	.2076E+01
.1603E-02	.95026E+00	.4839E-01	.3128E-01	.8476E-01	.13891E+01
.1690E-02	.94907E+00	.5799E-01	.3128E-01	.8432E-01	.8191E+01
.1778E-02	.94786E+00	.6932E-01	.3128E-01	.8381E-01	.4261E+01
.1865E-02	.94664E+00	.8267E-01	.3128E-01	.8326E-01	.2130E+01
.1953E-02	.94542E+00	.9807E-01	.3128E-01	.8267E-01	.1211E+01
.2041E-02	.94420E+00	.1154E-01	.3128E-01	.8206E-01	.6233E+01
.2129E-02	.94298E+00	.1352E-01	.3128E-01	.8144E-01	.2138E+01
.2217E-02	.94176E+00	.1595E-01	.3128E-01	.8073E-01	.2143E+01
.2305E-02	.94054E+00	.1893E-01	.3128E-01	.8002E-01	.2189E+01
.2393E-02	.93932E+00	.2254E-01	.3128E-01	.7931E-01	.2156E+01
.2481E-02	.93810E+00	.2678E-01	.3128E-01	.7860E-01	.2169E+01
.2569E-02	.93688E+00	.3174E-01	.3128E-01	.7789E-01	.2169E+01
.2657E-02	.93566E+00	.3751E-01	.3128E-01	.7718E-01	.2169E+01
.2745E-02	.93444E+00	.4410E-01	.3128E-01	.7647E-01	.2169E+01
.2833E-02	.93322E+00	.5169E-01	.3128E-01	.7576E-01	.2169E+01
.2921E-02	.93200E+00	.6038E-01	.3128E-01	.7505E-01	.2169E+01
.3009E-02	.93078E+00	.7027E-01	.3128E-01	.7434E-01	.2169E+01
.3097E-02	.92956E+00	.8146E-01	.3128E-01	.7363E-01	.2169E+01
.3185E-02	.92834E+00	.9405E-01	.3128E-01	.7292E-01	.2169E+01
.3273E-02	.92712E+00	.1081E-01	.3128E-01	.7221E-01	.2169E+01
.3361E-02	.92590E+00	.1238E-01	.3128E-01	.7150E-01	.2169E+01
.3449E-02	.92468E+00	.1417E-01	.3128E-01	.7079E-01	.2169E+01
.3537E-02	.92346E+00	.1618E-01	.3128E-01	.7008E-01	.2169E+01
.3625E-02	.92224E+00	.1842E-01	.3128E-01	.6937E-01	.2169E+01
.3713E-02	.92102E+00	.2089E-01	.3128E-01	.6866E-01	.2169E+01
.3801E-02	.91980E+00	.2459E-01	.3128E-01	.6795E-01	.2169E+01
.3889E-02	.91858E+00	.2964E-01	.3128E-01	.6724E-01	.2169E+01
.3977E-02	.91736E+00	.3605E-01	.3128E-01	.6653E-01	.2169E+01
.4065E-02	.91614E+00	.4384E-01	.3128E-01	.6582E-01	.2169E+01
.4153E-02	.91492E+00	.5313E-01	.3128E-01	.6511E-01	.2169E+01
.4241E-02	.91370E+00	.6402E-01	.3128E-01	.6440E-01	.2169E+01
.4329E-02	.91248E+00	.7661E-01	.3128E-01	.6369E-01	.2169E+01
.4417E-02	.91126E+00	.9099E-01	.3128E-01	.6308E-01	.2169E+01
.4505E-02	.91004E+00	.1072E-01	.3128E-01	.6247E-01	.2169E+01
.4593E-02	.90882E+00	.1264E-01	.3128E-01	.6186E-01	.2169E+01
.4681E-02	.90760E+00	.1486E-01	.3128E-01	.6125E-01	.2169E+01
.4769E-02	.90638E+00	.1739E-01	.3128E-01	.6064E-01	.2169E+01
.4857E-02	.90516E+00	.2024E-01	.3128E-01	.6003E-01	.2169E+01
.4945E-02	.90394E+00	.2341E-01	.3128E-01	.5942E-01	.2169E+01
.5033E-02	.90272E+00	.2690E-01	.3128E-01	.5881E-01	.2169E+01
.5121E-02	.90150E+00	.3171E-01	.3128E-01	.5820E-01	.2169E+01
.5209E-02	.90028E+00	.3694E-01	.3128E-01	.5759E-01	.2169E+01
.5297E-02	.89906E+00	.4359E-01	.3128E-01	.5698E-01	.2169E+01
.5385E-02	.89784E+00	.5166E-01	.3128E-01	.5637E-01	.2169E+01
.5473E-02	.89662E+00	.6115E-01	.3128E-01	.5576E-01	.2169E+01
.5561E-02	.89540E+00	.7206E-01	.3128E-01	.5515E-01	.2169E+01
.5649E-02	.89418E+00	.8439E-01	.3128E-01	.5454E-01	.2169E+01
.5737E-02	.89296E+00	.9814E-01	.3128E-01	.5393E-01	.2169E+01
.5825E-02	.89174E+00	.1134E-01	.3128E-01	.5332E-01	.2169E+01
.5913E-02	.89052E+00	.1307E-01	.3128E-01	.5271E-01	.2169E+01
.6001E-02	.88930E+00	.1514E-01	.3128E-01	.5210E-01	.2169E+01
.6089E-02	.88808E+00	.1755E-01	.3128E-01	.5149E-01	.2169E+01
.6177E-02	.88686E+00	.2030E-01	.3128E-01	.5088E-01	.2169E+01
.6265E-02	.88564E+00	.2339E-01	.3128E-01	.5027E-01	.2169E+01
.6353E-02	.88442E+00	.2682E-01	.3128E-01	.4966E-01	.2169E+01
.6441E-02	.88320E+00	.3159E-01	.3128E-01	.4905E-01	.2169E+01
.6529E-02	.88198E+00	.3680E-01	.3128E-01	.4844E-01	.2169E+01
.6617E-02	.88076E+00	.4245E-01	.3128E-01	.4783E-01	.2169E+01
.6705E-02	.87954E+00	.4854E-01	.3128E-01	.4722E-01	.2169E+01
.6793E-02	.87832E+00	.5507E-01	.3128E-01	.4661E-01	.2169E+01
.6881E-02	.87710E+00	.6204E-01	.3128E-01	.4600E-01	.2169E+01
.6969E-02	.87588E+00	.6945E-01	.3128E-01	.4539E-01	.2169E+01
.7057E-02	.87466E+00	.7730E-01	.3128E-01	.4478E-01	.2169E+01
.7145E-02	.87344E+00	.8569E-01	.3128E-01	.4417E-01	.2169E+01
.7233E-02	.87222E+00	.9462E-01	.3128E-01	.4356E-01	.2169E+01
.7321E-02	.87100E+00	.1041E-01	.3128E-01	.4295E-01	.2169E+01
.7409E-02	.86978E+00	.1141E-01	.3128E-01	.4234E-01	.2169E+01
.7497E-02	.86856E+00	.1251E-01	.3128E-01	.4173E-01	.2169E+01
.7585E-02	.86734E+00	.1371E-01	.3128E-01	.4112E-01	.2169E+01
.7673E-02	.86612E+00	.1501E-01	.3128E-01	.4051E-01	.2169E+01
.7761E-02	.86490E+00	.1641E-01	.3128E-01	.3990E-01	.2169E+01
.7849E-02	.86368E+00	.1791E-01	.3128E-01	.3929E-01	.2169E+01
.7937E-02	.86246E+00	.1951E-01	.3128E-01	.3868E-01	.2169E+01
.8025E-02	.86124E+00	.2121E-01	.3128E-01	.3807E-01	.2169E+01
.8113E-02	.86002E+00	.2301E-01	.3128E-01	.3746E-01	.2169E+01
.8201E-02	.85880E+00	.2491E-01	.3128E-01	.3685E-01	.2169E+01
.8289E-02	.85758E+00	.2691E-01	.3128E-01	.3624E-01	.2169E+01
.8377E-02	.85636E+00	.2901E-01	.3128E-01	.3563E-01	.2169E+01
.8465E-02	.85514E+00	.3121E-01	.3128E-01	.3502E-01	.2169E+01
.8553E-02	.85392E+00	.3351E-01	.3128E-01	.3441E-01	.2169E+01
.8641E-02	.85270E+00	.3591E-01	.3128E-01	.3380E-01	.2169E+01
.8729E-02	.85148E+00	.3841E-01	.3128E-01	.3319E-01	.2169E+01
.8817E-02	.85026E+00	.4101E-01	.3128E-01	.3258E-01	.2169E+01
.8905E-02	.84904E+00	.4371E-01	.3128E-01	.3197E-01	.2169E+01
.8993E-02	.84782E+00	.4651E-01	.3128E-01	.3136E-01	.2169E+01
.9081E-02	.84660E+00	.4941E-01	.3128E-01	.3075E-01	.2169E+01
.9169E-02	.84538E+00	.5241E-01	.3128E-01	.3014E-01	.2169E+01
.9257E-02	.84416E+00	.5551E-01	.3128E-01	.2953E-01	.2169E+01
.9345E-02	.84294E+00	.5871E-01	.3128E-01	.2892E-01	.2169E+01
.9433E-02	.84172E+00	.6201E-01	.3128E-01	.2831E-01	.2169E+01
.9521E-02	.84050E+00	.6541E-01	.3128E-01	.2770E-01	.2169E+01
.9609E-02	.83928E+00	.6891E-01	.3128E-01	.2709E-01	.2169E+01
.9697E-02	.83806E+00	.7251E-01	.3128E-01	.2648E-01	.2169E+01
.9785E-02	.83684E+00	.7621E-01	.3128E-01	.2587E-01	.2169E+01
.9873E-02	.83562E+00	.8001E-01	.3128E-01	.2526E-01	.2169E+01
.9961E-02	.83440E+00	.8391E-01	.3128E-01	.2465E-01	.2169E+01
.10049E-01	.83318E+00	.8791E-01	.3128E-01	.2404E-01	.2169E+01
.10137E-01	.83196E+00	.9201E-01	.3128E-01	.2343E-01	.2169E+01
.10225E-01	.83074E+00	.9621E-01	.3128E-01	.2282E-01	.2169E+01
.10313E-01	.82952E+00	.10051E-01	.3128E-01	.2221E-01	.2169E+01
.10401E-01	.82830E+00	.10491E-01	.3128E-01	.2160E-01	.2169E+01
.10489E-01	.82708E+00	.10941E-01	.3128E-01	.2100E-01	.2169E+01
.10577E-01	.82586E+00	.11391E-01	.3128E-01	.2039E-01	.2169E+01
.10665E-01	.82464E+00	.11841E-01	.3128E-01	.1978E-01	.2169E+01
.10753E-01	.82342E+00	.12291E-01	.3128E-01	.1917E-01	.2169E+01
.10841E-01	.82220E+00	.12741E-01	.3128E-01	.1856E-01	.2169E+01
.10929E-01	.82098E+00	.13191E-01	.3128E-01	.1795E-01	.2169E+01
.11017E-01	.81976E+00	.13641E-01	.3128E-01	.1734E-01	.2169E+01
.11105E-01	.81854E+00	.14091E-01	.3128E-01	.1673E-01	.2169E+01
.11193E-01	.81732E+00	.14541E-01	.3128E-01	.1612E-01	.2169E+01
.11281E-01	.81610E+00	.14991E-01	.3128E-01	.1551E-01	.2169E+01
.11369E-01	.81488E+00	.15441E-01	.3128E-01	.1490E-01	.2169E+01
.11457E-01	.81366E+00	.15891E-01	.3128E-01	.1429E-01	.2169E+01
.11545E-01	.81244E+00	.16341E-01	.3128E-01	.1368E-01	.2169E+01
.11633E-01	.81122E+00	.16791E-01	.3128E-01	.1307E-01	.2169E+01
.11721E-01	.81000E+00	.17241E-01	.3128E-01	.1246E-01	.2169E+01
.11809E-01	.80878E+00	.17691E-01	.3128E-01	.1185E-01	.2169E+01
.11897E-01	.80756E+00	.18141E-01	.3128E-01	.1124E-01	.2169E+01
.11985E-01	.80634E+00	.18591E-01	.3128E-01	.1063E-01	.2169E+01
.12073E-01	.80512E+00	.19041E-01	.3128E-01	.1002E-01	.2169E+01
.12161E-01	.80390E+00	.19491E-01	.3128E-01	.941E-01	.2169E+01
.12249E-01	.80268E+00	.19941E-01	.3128E-01	.880E-01	.2169E+01
.12337E-01	.80146E+00	.20391E-01	.3128E-01	.819E-01	.2169E+01
.12425E-01	.80024E+00	.20841E-01	.3128E-01	.758E-01	.2169E+01
.12513E-01	.79902E+00	.21291E-01	.3128E-01	.697E-01	.2169E+01
.12601E-01	.79780E+00	.21741E-01	.3128E-01	.636E-01	.2169E+01
.12689E-01	.79658E+00	.22191E-01	.3128E-01	.575E-01	.2169E+01

.10792E-03	.18644E+00	.15192E-03	.50274E-01	.73092E-01	.62966E+01
.11805E-03	.17036E+00	.18715E-03	.53758E-01	.73893E-01	.63013E+01
.12818E-03	.18418E+00	.22664E-03	.57051E-01	.73895E-01	.63397E+01
.15057E-03	.21440E+00	.32916E-03	.63698E-01	.75899E-01	.64149E+01
.17531E-03	.24735E+00	.46826E-03	.70074E-01	.73895E-01	.64676E+01
.20264E-03	.28327E+00	.65391E-03	.76026E-01	.73921E-01	.65061E+01
.23201E-03	.32230E+00	.89874E-03	.81349E-01	.73940E-01	.65281E+01
.26603E-03	.36487E+00	.12154E-02	.85798E-01	.73963E-01	.65326E+01
.30255E-03	.41092E+00	.16399E-02	.89122E-01	.73996E-01	.64499E+01
.34520E-03	.44802E+00	.21580E-02	.91112E-01	.74038E-01	.63289E+01
.39203E-03	.50205E+00	.28244E-02	.91200E-01	.74092E-01	.61434E+01
.44393E-03	.56235E+00	.36240E-02	.89068E-01	.74157E-01	.58715E+01
.51096E-03	.64773E+00	.45891E-02	.84395E-01	.74232E-01	.54972E+01
.56316E-03	.71560E+00	.55400E-02	.77325E-01	.74322E-01	.50182E+01
.63150E-03	.76456E+00	.65250E-02	.67862E-01	.74615E-01	.44919E+01
.71667E-03	.85109E+00	.73572E-02	.58862E-01	.74925E-01	.38803E+01
.78937E-03	.90850E+00	.79675E-02	.46274E-01	.74612E-01	.29378E+01
.88033E-03	.94777E+00	.86137E-02	.39435E-01	.74686E-01	.22800E+01
.97482E-03	.98303E+00	.98312E-02	.39612E-01	.74710E-01	.19479E+01
.11693E-02	.98446E+00	.11404E-01	.46268E-01	.74744E-01	.18601E+01
.12583E-02	.98208E+00	.13380E-01	.55988E-01	.74629E-01	.18945E+01
.13525E-02	.98971E+00	.17274E-01	.74814E-01	.74412E-01	.19278E+01
.14468E-02	.98840E+00	.19123E-01	.84324E-01	.74314E-01	.19403E+01
.15410E-02	.93714E+00	.20912E-01	.92383E-01	.74133E-01	.19311E+01
.16353E-02	.93583E+00	.22651E-01	.10175E+00	.74079E-01	.19689E+01
.17296E-02	.95448E+00	.24360E-01	.11039E+00	.73524E-01	.19702E+01
.18238E-02	.95308E+00	.25990E-01	.11888E+00	.73101E-01	.19790E+01
.19157E-02	.95167E+00	.27590E-01	.12707E+00	.73192E-01	.19878E+01
.19982E-02	.95037E+00	.28922E-01	.13431E+00	.73308E-01	.19939E+01
.20712E-02	.94921E+00	.30131E-01	.14068E+00	.73194E-01	.19975E+01
.21372E-02	.94814E+00	.31155E-01	.14638E+00	.73101E-01	.20043E+01
.21961E-02	.94719E+00	.32132E-01	.15126E+00	.72922E-01	.20300E+01
.22503E-02	.94633E+00	.32912E-01	.15567E+00	.72849E-01	.20114E+01
.22998E-02	.94557E+00	.33759E-01	.15958E+00	.72755E-01	.20138E+01
.23446E-02	.94490E+00	.34369E-01	.16288E+00	.72613E-01	.20160E+01
.23846E-02	.94436E+00	.35131E-01	.16568E+00	.72490E-01	.20172E+01
.24209E-02	.94392E+00	.35582E-01	.16775E+00	.72408E-01	.20186E+01
.24539E-02	.94359E+00	.36343E-01	.16945E+00	.72375E-01	.20186E+01
.24845E-02	.94334E+00	.36818E-01	.17055E+00	.72274E-01	.20179E+01
.25128E-02	.94324E+00	.37746E-01	.17133E+00	.72139E-01	.20179E+01
		0.			
.13204E-04	.13996E-01	.19083E-03	.56721E-02	.63462E-01	.55993E+01
.21429E-04	.29186E-01	.82733E-03	.11634E-01	.63462E-01	.55644E+01

.33674E-04	.45531E-01	.10933E-04	.17821E-01	.63445E-01	.57742E+01
.47195E-04	.63332E-01	.34703E-04	.24286E-01	.63447E-01	.58655E+01
.62246E-04	.82872E-01	.55631E-04	.31832E-01	.83448E-01	.59580E+01
.75828E-04	.10410E+00	.81626E-04	.38010E-01	.63452E-01	.60694E+01
.96941E-04	.12696E+00	.11154E-03	.45041E-01	.63455E-01	.61375E+01
.10689E-03	.13939E+00	.12693E-03	.48684E-01	.63458E-01	.61813E+01
.11684E-03	.15174E+00	.14417E-03	.52122E-01	.63461E-01	.62231E+01
.12781E-03	.16525E+00	.16129E-03	.55749E-01	.63464E-01	.62616E+01
.13878E-03	.17688E+00	.17749E-03	.59187E-01	.63468E-01	.62983E+01
.16301E-03	.20804E+00	.20864E-03	.66129E-01	.63478E-01	.63660E+01
.16900E-03	.24007E+00	.23290E-03	.72818E-01	.63490E-01	.64210E+01
.21939E-03	.27499E+00	.24268E-03	.79888E-01	.63507E-01	.64958E+01
.25205E-03	.31301E+00	.22955E-03	.84707E-01	.63528E-01	.64739E+01
.28802E-03	.35436E+00	.18125E-03	.89459E-01	.63555E-01	.64597E+01
.32786E-03	.39919E+00	.84352E-04	.95070E-01	.63566E-01	.64685E+01
.37373E-03	.45075E+00	.88468E-04	.95334E-01	.63628E-01	.63034E+01
.42450E-03	.50645E+00	.35150E-03	.95650E-01	.63676E-01	.61337E+01
.48062E-03	.56669E+00	.71851E-03	.93601E-01	.63734E-01	.58831E+01
.54236E-03	.63106E+00	.11936E-02	.89139E-01	.63795E-01	.55357E+01
.61971E-03	.69844E+00	.17421E-02	.81936E-01	.63869E-01	.50792E+01
.68369E-03	.76786E+00	.23093E-02	.72164E-01	.63930E-01	.45804E+01
.76507E-03	.83644E+00	.27522E-02	.60463E-01	.64025E-01	.38846E+01
.85461E-03	.89834E+00	.29614E-02	.48543E-01	.64152E-01	.30488E+01
.95308E-03	.94418E+00	.38998E-02	.39782E-01	.64191E-01	.23407E+01
.10554E-02	.96549E+00	.37307E-02	.37937E-01	.64152E-01	.19107E+01
.11577E-02	.96859E+00	.44362E-02	.43581E-01	.64207E-01	.17803E+01
.12600E-02	.96825E+00	.62890E-02	.53463E-01	.64114E-01	.17957E+01
.14643E-02	.98486E+00	.92781E-02	.73859E-01	.63956E-01	.18246E+01
.15664E-02	.98282E+00	.18998E-01	.84852E-01	.63800E-01	.18337E+01
.16684E-02	.98155E+00	.11832E-01	.93905E-01	.63761E-01	.18412E+01
.17704E-02	.96841E+00	.12988E-01	.10396E+00	.63690E-01	.18476E+01
.18725E-02	.99911E+00	.14118E-01	.11308E+00	.63566E-01	.18594E+01
.19745E-02	.99775E+00	.15115E-01	.12246E+00	.63510E-01	.18587E+01
.20740E-02	.99637E+00	.16109E-01	.13152E+00	.63392E-01	.18673E+01
.21833E-02	.99500E+00	.16867E-01	.13955E+00	.63364E-01	.18724E+01
.22424E-02	.99390E+00	.17594E-01	.14662E+00	.63270E-01	.18730E+01
.23130E-02	.99282E+00	.18125E-01	.15298E+00	.63264E-01	.18740E+01
.23778E-02	.99149E+00	.18892E-01	.15844E+00	.63177E-01	.18740E+01
.24363E-02	.98995E+00	.19077E-01	.16340E+00	.63193E-01	.18766E+01
.24898E-02	.98815E+00	.19586E-01	.16779E+00	.63088E-01	.18776E+01
.25383E-02	.94444E+00	.19688E-01	.17152E+00	.63134E-01	.18788E+01
.25817E-02	.94807E+00	.20377E-01	.17435E+00	.62993E-01	.18791E+01

26219E-02	94239E+00	2056E-01	17709E+00	6309E-01	18799E+01
26567E-02	94804E+00	2119E-01	17902E+00	62054E-01	18799E+01
26898E-02	94777E+00	2119E-01	18027E+00	6310E-01	18833E+01
27203E-02	94767E+00	2220E-01	18107E+00	62588E-01	18769E+01
0.	0.	0.	0.	54495E-01	59093E+01
11055E-04	13569E-01	4564E-05	56575E-02	54499E-01	55911E+01
23216E-04	28301E-01	1797E-04	1109E-01	5450E-01	58793E+01
36483E-04	44162E-01	4665E-04	17792E-01	54508E-01	57602E+01
51131E-04	61443E-01	8819E-04	24259E-01	54514E-01	58472E+01
67437E-04	80419E-01	1899E-05	31038E-01	54518E-01	59350E+01
85402E-04	10104E+00	2240E-03	38010E-01	54527E-01	60219E+01
13503E-03	12326E+00	3214E-03	45088E-01	54531E-01	61057E+01
11380E-03	13934E+00	3794E-03	58709E-01	54537E-01	61471E+01
12658E-03	14734E+00	4403E-03	52188E-01	54540E-01	61853E+01
13847E-03	16648E+00	5102E-03	55839E-01	54546E-01	62239E+01
15035E-03	17354E+00	5828E-03	59103E-01	54551E-01	62589E+01
17661E-03	20209E+00	7490E-03	66311E-01	54556E-01	63238E+01
21563E-03	23324E+00	9394E-03	73082E-01	54579E-01	63767E+01
23769E-03	26720E+00	1199E-02	79444E-01	54800E-01	64126E+01
27307E-03	30420E+00	1374E-02	85192E-01	54619E-01	64295E+01
31204E-03	34443E+00	1604E-02	90177E-01	54647E-01	64162E+01
35489E-03	38808E+00	1830E-02	93863E-01	54679E-01	63729E+01
40493E-03	43832E+00	2046E-02	96327E-01	54714E-01	62769E+01
45799E-03	49268E+00	2220E-02	96807E-01	54752E-01	61212E+01
52078E-03	55163E+00	2339E-02	95138E-01	54801E-01	58900E+01
56755E-03	61488E+00	2377E-02	90834E-01	54844E-01	55674E+01
66055E-03	68153E+00	2362E-02	83810E-01	54899E-01	51408E+01
74071E-03	75102E+00	2534E-02	74100E-01	54940E-01	48915E+01
82087E-03	82108E+00	2415E-02	62244E-01	54997E-01	39184E+01
92585E-03	88674E+00	2739E-02	49561E-01	55024E-01	31522E+01
10326E-02	93887E+00	3297E-02	39117E-01	55061E-01	24029E+01
11431E-02	96623E+00	3323E-02	35327E-01	55024E-01	18932E+01
12542E-02	97236E+00	2871E-02	39532E-01	55049E-01	17036E+01
13651E-02	97032E+00	1672E-02	59108E-01	54958E-01	17018E+01
14759E-02	96969E+00	4409E-03	59670E-01	54990E-01	17217E+01
15864E-02	96033E+00	5017E-03	70475E-01	54773E-01	17267E+01
16973E-02	96722E+00	1305E-02	81101E-01	54832E-01	17322E+01
18075E-02	96616E+00	2043E-02	91675E-01	54561E-01	17365E+01
19181E-02	96503E+00	2637E-02	10194E+00	54680E-01	17394E+01
20288E-02	96382E+00	3203E-02	11218E+00	54382E-01	17419E+01
21392E-02	96254E+00	3602E-02	12222E+00	54335E-01	17440E+01
22478E-02	96122E+00	4086E-02	13194E+00	54251E-01	17455E+01
23431E-02	95997E+00	4203E-02	14037E+00	54248E-01	17467E+01
24294E-02	95882E+00	4434E-02	14818E+00	54196E-01	17473E+01

.25068E-02	.95775E+00	-.44998E-02	.15497E+00	.54228E-01	.17479E+01
.25759E-02	.95677E+00	-.46588E-02	.16097E+00	.54104E-01	.17480E+01
.26399E-02	.95586E+00	-.48322E-02	.16837E+00	.54288E-01	.17482E+01
.26975E-02	.95514E+00	-.49245E-02	.17117E+00	.54200E-01	.17486E+01
.27530E-02	.95431E+00	-.47823E-02	.17527E+00	.54296E-01	.17481E+01
.27970E-02	.95371E+00	-.50489E-02	.17870E+00	.54210E-01	.17476E+01
.28396E-02	.95328E+00	-.49617E-02	.18141E+00	.54366E-01	.17479E+01
.28762E-02	.95284E+00	-.54443E-02	.18354E+00	.54175E-01	.17470E+01
.29142E-02	.95254E+00	-.51989E-02	.18588E+00	.54508E-01	.17480E+01
.29473E-02	.95247E+00	-.62921E-02	.18576E+00	.53979E-01	.17459E+01
				.67692E-01	.55093E+01
.11954E-04	.13201E-01	.69531E-05	.54612E-02	.67898E-01	.55870E+01
.25103E-04	.27542E-01	.30490E-04	.11211E-01	.67105E-01	.56670E+01
.39448E-04	.42986E-01	.72399E-04	.17190E-01	.67111E-01	.57481E+01
.55286E-04	.59819E-01	.13798E-03	.23449E-01	.67121E-01	.58389E+01
.72918E-04	.78310E-01	.23122E-03	.30314E-01	.67126E-01	.59142E+01
.92343E-04	.98409E-01	.35645E-03	.36778E-01	.67139E-01	.59970E+01
.11356E-03	.12887E+00	.51772E-03	.43632E-01	.67144E-01	.60769E+01
.12522E-03	.13165E+00	.61488E-03	.47172E-01	.67151E-01	.61164E+01
.13687E-03	.14355E+00	.71798E-03	.50559E-01	.67155E-01	.61530E+01
.14972E-03	.15637E+00	.83758E-03	.54110E-01	.67163E-01	.61899E+01
.16257E-03	.16910E+00	.96318E-03	.57485E-01	.67168E-01	.62233E+01
.17096E-03	.17695E+00	.12578E-02	.64323E-01	.67186E-01	.62855E+01
.22234E-03	.22732E+00	.16065E-02	.70945E-01	.67198E-01	.63265E+01
.25701E-03	.26045E+00	.20072E-02	.77191E-01	.67241E-01	.63725E+01
.29526E-03	.29653E+00	.24629E-02	.82850E-01	.67238E-01	.63887E+01
.33740E-03	.33577E+00	.29636E-02	.87719E-01	.67288E-01	.63794E+01
.38372E-03	.37835E+00	.35066E-02	.91517E-01	.67287E-01	.63388E+01
.43781E-03	.42740E+00	.41092E-02	.94075E-01	.67322E-01	.62499E+01
.49725E-03	.48052E+00	.47273E-02	.96796E-01	.67348E-01	.61896E+01
.54303E-03	.53823E+00	.53395E-02	.93323E-01	.67385E-01	.58984E+01
.63535E-03	.60036E+00	.59376E-02	.89368E-01	.67418E-01	.55887E+01
.71424E-03	.66619E+00	.65131E-02	.82773E-01	.67443E-01	.51867E+01
.80091E-03	.73544E+00	.71188E-02	.73498E-01	.67458E-01	.46660E+01
.84624E-03	.80639E+00	.78461E-02	.61888E-01	.67481E-01	.40171E+01
.10811E-02	.87492E+00	.86435E-02	.49278E-01	.67472E-01	.32372E+01
.11165E-02	.93253E+00	.10166E-01	.37645E-01	.67467E-01	.24733E+01
.12363E-02	.96604E+00	.11028E-01	.32241E-01	.67385E-01	.18913E+01
.13562E-02	.97554E+00	.10489E-01	.34742E-01	.67342E-01	.16399E+01
.14760E-02	.97411E+00	.10248E-01	.43522E-01	.67224E-01	.16155E+01
.15958E-02	.97282E+00	.93532E-02	.54270E-01	.67096E-01	.16346E+01
.17155E-02	.97234E+00	.87367E-02	.64976E-01	.66953E-01	.16363E+01
.18349E-02	.97140E+00	.81062E-02	.75949E-01	.66612E-01	.16379E+01

.19545E-02	.97050E+00	.00710E-02	.06750E-01	.46666E-01	.16392E+01
.23740E-02	.96953E+00	.79814E-02	.97406E-01	.46543E-01	.16308E+01
.27955E-02	.98849E+00	.79358E-02	.10795E+00	.46414E-01	.16382E+01
.23131E-02	.96731E+00	.80707E-02	.11839E+00	.46333E-01	.16372E+01
.28296E-02	.96609E+00	.82145E-02	.12850E+00	.46234E-01	.16359E+01
.23342E-02	.98493E+00	.83371E-02	.13749E+00	.46214E-01	.16346E+01
.28269E-02	.96384E+00	.87741E-02	.14542E+00	.46161E-01	.16331E+01
.27105E-02	.96281E+00	.91425E-02	.15252E+00	.46108E-01	.16318E+01
.27892E-02	.96188E+00	.93728E-02	.15882E+00	.46153E-01	.16305E+01
.28540E-02	.96098E+00	.97409E-02	.16449E+00	.46226E-01	.16292E+01
.23167E-02	.96018E+00	.98920E-02	.16957E+00	.46196E-01	.16278E+01
.27732E-02	.95949E+00	.10234E-01	.17391E+00	.46307E-01	.16270E+01
.30241E-02	.95865E+00	.10213E-01	.17758E+00	.46248E-01	.16257E+01
.33703E-02	.95633E+00	.10534E-01	.18047E+00	.46427E-01	.16255E+01
.31222E-02	.95797E+00	.10388E-01	.18274E+00	.46264E-01	.16242E+01
.31510E-02	.95765E+00	.10695E-01	.18414E+00	.46642E-01	.16254E+01
.31069E-02	.95761E+00	.95035E-02	.18500E+00	.46101E-01	.16230E+01
.12069E-04	.12915E-01	.90154E-03	.51064E-02	.41109E-01	.58093E+01
.27025E-04	.26940E-01	.39826E-04	.10487E-01	.41117E-01	.55834E+01
.62468E-04	.42067E-01	.94887E-04	.16085E-01	.41126E-01	.56598E+01
.59520E-04	.50558E-01	.10157E-03	.21950E-01	.41133E-01	.57373E+01
.75502E-04	.76662E-01	.30546E-03	.28107E-01	.41145E-01	.58162E+01
.99415E-04	.96352E-01	.47365E-03	.34457E-01	.41158E-01	.58962E+01
.12226E-03	.11757E+00	.69031E-03	.40097E-01	.41167E-01	.59755E+01
.13461E-03	.12912E+00	.82209E-03	.44225E-01	.41171E-01	.60522E+01
.16119E-03	.15314E+00	.11263E-02	.50756E-01	.41184E-01	.61251E+01
.37502E-03	.16562E+00	.12992E-02	.53936E-01	.41193E-01	.61606E+01
.23999E-03	.19298E+00	.17880E-02	.60387E-01	.41198E-01	.61927E+01
.23937E-03	.22266E+00	.21905E-02	.66640E-01	.41210E-01	.62323E+01
.27669E-03	.25511E+00	.2713E-02	.72565E-01	.41228E-01	.63017E+01
.31787E-03	.29048E+00	.34394E-02	.77952E-01	.41252E-01	.63365E+01
.36323E-03	.32868E+00	.41813E-02	.82603E-01	.41269E-01	.63926E+01
.41310E-03	.37059E+00	.50193E-02	.86269E-01	.41291E-01	.64445E+01
.47234E-03	.42838E+00	.59833E-02	.88792E-01	.41306E-01	.65059E+01
.53536E-03	.47869E+00	.70235E-02	.89607E-01	.41334E-01	.65238E+01
.60814E-03	.52733E+00	.81197E-02	.88385E-01	.41348E-01	.65870E+01
.68400E-03	.58844E+00	.92719E-02	.84833E-01	.41373E-01	.66835E+01
.75894E-03	.63345E+00	.10461E-01	.78790E-01	.41380E-01	.67979E+01
.86224E-03	.72231E+00	.11745E-01	.78195E-01	.41392E-01	.52160E+01
.98487E-03	.83565E+00	.13280E-01	.89263E-01	.41392E-01	.47183E+01
.11778E-02	.86410E+00	.14986E-01	.46914E-01	.41375E-01	.40915E+01
				.41331E-01	.33423E+01

.12620E-02	.92610E+00	.17160E-01	.35327E-01	.45270E-01	.25388E+01
.13310E-02	.96504E+00	.18370E-01	.26707E-01	.61135E-01	.10922E+01
.14600E-02	.97807E+00	.19000E-01	.29888E-01	.43922E-01	.15863E+01
.15290E-02	.97746E+00	.19071E-01	.37420E-01	.47854E-01	.15387E+01
.17180E-02	.97614E+00	.18434E-01	.47698E-01	.40869E-01	.15561E+01
.18661E-02	.97598E+00	.18090E-01	.58108E-01	.03398E-01	.19367E+01
.19755E-02	.97524E+00	.18057E-01	.68915E-01	.40247E-01	.15524E+01
.21841E-02	.97452E+00	.18090E-01	.79681E-01	.40053E-01	.15524E+01
.22320E-02	.97378E+00	.18041E-01	.90299E-01	.39688E-01	.14732E+01
.23615E-02	.97286E+00	.18782E-01	.10086E+00	.39688E-01	.15439E+01
.24902E-02	.97189E+00	.19411E-01	.11132E+00	.39548E-01	.15401E+01
.26151E-02	.97083E+00	.20041E-01	.12148E+00	.39008E-01	.15363E+01
.27283E-02	.96981E+00	.20817E-01	.13051E+00	.39337E-01	.15328E+01
.28280E-02	.96884E+00	.21478E-01	.13851E+00	.39254E-01	.15298E+01
.29181E-02	.96790E+00	.22220E-01	.14587E+00	.39240E-01	.15288E+01
.29985E-02	.96704E+00	.22813E-01	.15204E+00	.39149E-01	.15248E+01
.30725E-02	.96622E+00	.23498E-01	.15779E+00	.39240E-01	.15217E+01
.31401E-02	.96547E+00	.23943E-01	.16299E+00	.39289E-01	.15192E+01
.32012E-02	.96478E+00	.24541E-01	.16739E+00	.39297E-01	.15176E+01
.32559E-02	.96422E+00	.24734E-01	.17113E+00	.39246E-01	.15158E+01
.33051E-02	.96371E+00	.25258E-01	.17412E+00	.39182E-01	.15139E+01
.33505E-02	.96330E+00	.25020E-01	.17643E+00	.39263E-01	.15132E+01
.33921E-02	.96308E+00	.25777E-01	.17766E+00	.39661E-01	.15146E+01
.34380E-02	.96307E+00	.24390E-01	.17872E+00	.39078E-01	.15113E+01
.34767E-04	.12716E-01	.18788E-04	.46172E-02	.36373E-01	.55805E+01
.28911E-04	.27537E-01	.67947E-04	.98897E-02	.38893E-01	.56939E+01
.45431E-04	.41431E-01	.11348E-03	.14552E-01	.36391E-01	.57285E+01
.53612E-04	.57672E-01	.21709E-03	.19864E-01	.36405E-01	.58044E+01
.83978E-04	.75928E-01	.36789E-03	.23444E-01	.36410E-01	.58018E+01
.10635E-03	.94928E-01	.57632E-03	.31202E-01	.36429E-01	.59988E+01
.13079E-03	.11584E+00	.83392E-03	.37047E-01	.36431E-01	.60319E+01
.14421E-03	.12722E+00	.99449E-03	.40009E-01	.36442E-01	.60657E+01
.15763E-03	.13852E+00	.11664E-02	.42961E-01	.36448E-01	.61023E+01
.17243E-03	.15090E+00	.13672E-02	.46003E-01	.36455E-01	.61365E+01
.18723E-03	.16328E+00	.15798E-02	.48899E-01	.36460E-01	.61616E+01
.21933E-03	.19070E+00	.20848E-02	.54765E-01	.36482E-01	.62253E+01
.25806E-03	.21948E+00	.26953E-02	.60470E-01	.36498E-01	.62727E+01
.29599E-03	.25137E+00	.34142E-02	.65471E-01	.36513E-01	.63063E+01
.34004E-03	.28617E+00	.42574E-02	.70883E-01	.36521E-01	.63218E+01
.38857E-03	.32408E+00	.52106E-02	.75871E-01	.36545E-01	.63139E+01
.44492E-03	.36584E+00	.63183E-02	.80437E-01	.36552E-01	.62767E+01
.50421E-03	.41232E+00	.75937E-02	.88024E-01	.36574E-01	.61969E+01

.57274E-03	.46358E+00	.90134E-02	.81655E-01	.36576E-01	.60658E+01
.54842E-03	.51934E+00	.10553E-01	.60629E-01	.36584E-01	.58701E+01
.73171E-03	.97961E+00	.12201E-01	.77502E-01	.36579E-01	.59594E+01
.82257E-03	.64340E+00	.14066E-01	.72189E-01	.36574E-01	.52376E+01
.92239E-03	.71231E+00	.15970E-01	.64367E-01	.36542E-01	.47670E+01
.10322E-02	.78558E+00	.18122E-01	.54931E-01	.36535E-01	.41379E+01
.11530E-02	.85553E+00	.20815E-01	.43062E-01	.36534E-01	.34003E+01
.12658E-02	.92453E+00	.23915E-01	.31900E-01	.36338E-01	.25800E+01
.14238E-02	.98594E+00	.26707E-01	.25938E-01	.36189E-01	.19024E+01
.15619E-02	.98003E+00	.27734E-01	.25032E-01	.35951E-01	.15355E+01
.16999E-02	.98630E+00	.27710E-01	.31320E-01	.35714E-01	.14723E+01
.18379E-02	.97898E+00	.27256E-01	.40698E-01	.35435E-01	.14869E+01
.19756E-02	.97909E+00	.27028E-01	.50475E-01	.35181E-01	.14829E+01
.21132E-02	.97863E+00	.27380E-01	.60629E-01	.34934E-01	.14767E+01
.22509E-02	.97813E+00	.27599E-01	.70927E-01	.34659E-01	.14723E+01
.23886E-02	.97760E+00	.28253E-01	.81135E-01	.34397E-01	.14662E+01
.25262E-02	.97692E+00	.28565E-01	.91275E-01	.34155E-01	.14603E+01
.26639E-02	.97617E+00	.29977E-01	.10133E+00	.33933E-01	.14541E+01
.27981E-02	.97532E+00	.31015E-01	.11118E+00	.33740E-01	.14462E+01
.29186E-02	.97448E+00	.32167E-01	.11992E+00	.33621E-01	.14390E+01
.30253E-02	.97365E+00	.33386E-01	.12767E+00	.33491E-01	.14333E+01
.31216E-02	.97288E+00	.34251E-01	.13460E+00	.33322E-01	.14242E+01
.32077E-02	.97214E+00	.35140E-01	.14078E+00	.33153E-01	.14130E+01
.32868E-02	.97143E+00	.36080E-01	.14638E+00	.32964E-01	.14027E+01
.33591E-02	.97079E+00	.36777E-01	.15141E+00	.32865E-01	.14238E+01
.34245E-02	.97018E+00	.37569E-01	.15575E+00	.32836E-01	.14214E+01
.34830E-02	.96970E+00	.37938E-01	.15944E+00	.32776E-01	.14188E+01
.35360E-02	.96924E+00	.38622E-01	.16236E+00	.32681E-01	.14177E+01
.35842E-02	.96897E+00	.38450E-01	.16465E+00	.32575E-01	.14154E+01
.36290E-02	.96863E+00	.39433E-01	.16870E+00	.32505E-01	.14169E+01
.36703E-02	.96877E+00	.37627E-01	.16684E+00	.32989E-01	.14125E+01
0.	0.	0.	0.	.32869E-01	.55093E+01
.14606E-04	.12601E-01	.12007E-04	.40173E-12	.32678E-01	.59782E+01
.30676E-04	.26293E-01	.53621E-04	.82540E-02	.32689E-01	.56493E+01
.48205E-04	.41064E-01	.12811E-03	.12668E-01	.32897E-01	.57216E+01
.67560E-04	.57165E-01	.24615E-03	.17293E-01	.32712E-01	.57593E+01
.69106E-04	.74862E-01	.41580E-03	.22155E-01	.32717E-01	.58702E+01
.11284E-03	.94104E-01	.64714E-03	.27175E-01	.32737E-01	.59445E+01
.13877E-03	.11876E+00	.94712E-03	.32273E-01	.32743E-01	.60183E+01
.15301E-03	.12613E+00	.11311E-02	.34918E-01	.32750E-01	.60518E+01
.16726E-03	.13733E+00	.13278E-02	.37432E-01	.32754E-01	.60846E+01
.18298E-03	.14988E+00	.15982E-02	.40018E-01	.32763E-01	.61178E+01
.19856E-03	.16179E+00	.18022E-02	.42611E-01	.32768E-01	.61480E+01

.2336E-03	.18044E+00	.23340E-02	.47739E-01	.32790E-01	.62037E+01
.27170E-03	.21749E+00	.30909E-02	.52725E-01	.32795E-01	.62498E+01
.31406E-03	.24915E+00	.39260E-02	.67491E-01	.32818E-01	.62821E+01
.36041E-03	.28361E+00	.49163E-02	.81771E-01	.32821E-01	.62965E+01
.41230E-03	.32165E+00	.60522E-02	.95516E-01	.32842E-01	.62881E+01
.46890E-03	.36189E+00	.72995E-02	.98497E-01	.32842E-01	.62909E+01
.53500E-03	.40841E+00	.89063E-02	.70595E-01	.32658E-01	.61721E+01
.61768E-03	.45907E+00	.10649E-01	.71348E-01	.32648E-01	.60434E+01
.68802E-03	.51422E+00	.12973E-01	.76901E-01	.32691E-01	.58917E+01
.77639E-03	.57366E+00	.14708E-01	.67814E-01	.32826E-01	.55832E+01
.87240E-03	.63757E+00	.17025E-01	.63140E-01	.32806E-01	.52241E+01
.97871E-03	.70959E+00	.19828E-01	.58420E-01	.32793E-01	.47947E+01
.10952E-02	.77708E+00	.22566E-01	.57763E-01	.32698E-01	.41583E+01
.12234E-02	.84940E+00	.26040E-01	.37728E-01	.32682E-01	.34306E+01
.13643E-02	.91641E+00	.30092E-01	.27749E-01	.32471E-01	.26128E+01
.15102E-02	.96303E+00	.33817E-01	.21089E-01	.32264E-01	.19011E+01
.16572E-02	.98157E+00	.35547E-01	.20399E-01	.31972E-01	.15085E+01
.18037E-02	.98260E+00	.35714E-01	.25452E-01	.31669E-01	.14161E+01
.19501E-02	.98133E+00	.35388E-01	.33625E-01	.31803E-01	.14212E+01
.20962E-02	.98172E+00	.35268E-01	.42281E-01	.31803E-01	.14212E+01
.22423E-02	.98191E+00	.35726E-01	.51485E-01	.30665E-01	.14118E+01
.23803E-02	.98124E+00	.36221E-01	.60432E-01	.30347E-01	.14048E+01
.25344E-02	.98046E+00	.37114E-01	.70193E-01	.30041E-01	.13963E+01
.26865E-02	.98052E+00	.38097E-01	.79546E-01	.29735E-01	.13883E+01
.28366E-02	.98092E+00	.39398E-01	.88815E-01	.29475E-01	.13802E+01
.29908E-02	.97941E+00	.40758E-01	.97902E-01	.29209E-01	.13726E+01
.30568E-02	.97879E+00	.42196E-01	.10597E+00	.29028E-01	.13684E+01
.32100E-02	.97818E+00	.43504E-01	.11314E+00	.28837E-01	.13601E+01
.33123E-02	.97750E+00	.44806E-01	.11955E+00	.28721E-01	.13550E+01
.34656E-02	.97742E+00	.45937E-01	.12527E+00	.28699E-01	.13504E+01
.36176E-02	.97646E+00	.47061E-01	.13045E+00	.28533E-01	.13463E+01
.37643E-02	.97598E+00	.47953E-01	.13542E+00	.28441E-01	.13424E+01
.38366E-02	.97549E+00	.48866E-01	.13997E+00	.28438E-01	.13393E+01
.39511E-02	.97511E+00	.49380E-01	.144260E+00	.28356E-01	.13361E+01
.37520E-02	.97475E+00	.50124E-01	.14523E+00	.28436E-01	.13344E+01
.36031E-02	.97456E+00	.50606E-01	.14746E+00	.28279E-01	.13317E+01
.36506E-02	.97425E+00	.51153E-01	.14869E+00	.28641E-01	.13331E+01
.36944E-02	.97455E+00	.48703E-01	.14949E+00	.27827E-01	.13269E+01
.35354E-02	.97455E+00	.48703E-01	.14949E+00	.27827E-01	.13269E+01
.35354E-04	.12555E-01	.12974E-04	.33262E-02	.29862E-01	.55766E+01
.32243E-04	.26204E-01	.58173E-04	.66347E-02	.29873E-01	.56460E+01
.50668E-04	.48910E-01	.13909E-03	.10409E-01	.29881E-01	.57166E+01
.71012E-04	.58965E-01	.26740E-03	.14323E-01	.29897E-01	.57687E+01

.93659E-04	.74602E-01	.45199E-03	.18351E-01	.29822E-01	.58619E+01
.11361E-03	.93780E-01	.78453E-03	.22511E-01	.29323E-01	.59345E+01
.14986E-03	.11448E+00	.10328E-02	.23736E-01	.29323E-01	.60048E+01
.16083E-03	.12569E+00	.12336E-02	.26922E-01	.29335E-01	.60395E+01
.17580E-03	.13685E+00	.14490E-02	.31014E-01	.29938E-01	.60716E+01
.19231E-03	.14708E+00	.17014E-02	.35215E-01	.29948E-01	.61040E+01
.20881E-03	.16123E+00	.19696E-02	.39309E-01	.29952E-01	.61334E+01
.24528E-03	.18777E+00	.26095E-02	.39561E-01	.29974E-01	.61879E+01
.28990E-03	.21670E+00	.33897E-02	.47619E-01	.29988E-01	.62363E+01
.33011E-03	.24821E+00	.43169E-02	.47619E-01	.29988E-01	.62633E+01
.37924E-03	.28249E+00	.54169E-02	.51205E-01	.29997E-01	.62765E+01
.43337E-03	.31972E+00	.66881E-02	.53119E-01	.30119E-01	.62871E+01
.49206E-03	.36807E+00	.81574E-02	.57922E-01	.30086E-01	.62290E+01
.56234E-03	.40650E+00	.99204E-02	.59537E-01	.30819E-01	.61497E+01
.63673E-03	.45680E+00	.11924E-01	.59187E-01	.30002E-01	.60212E+01
.72317E-03	.51153E+00	.14164E-01	.58471E-01	.29994E-01	.58307E+01
.81607E-03	.57072E+00	.16685E-01	.58247E-01	.29956E-01	.55647E+01
.91740E-03	.63399E+00	.19662E-01	.58281E-01	.29829E-01	.52108E+01
.10287E-02	.70161E+00	.22620E-01	.46803E-01	.23860E-01	.47471E+01
.11512E-02	.77290E+00	.26213E-01	.39612E-01	.29787E-01	.41588E+01
.12899E-02	.84581E+00	.30454E-01	.31238E-01	.29672E-01	.34586E+01
.14341E-02	.91380E+00	.35317E-01	.22803E-01	.29515E-01	.26209E+01
.15880E-02	.96254E+00	.39959E-01	.16950E-01	.29277E-01	.18926E+01
.17419E-02	.98228E+00	.42298E-01	.19988E-01	.28927E-01	.14763E+01
.18958E-02	.98440E+00	.42689E-01	.19931E-01	.28562E-01	.13780E+01
.20498E-02	.98319E+00	.42557E-01	.26647E-01	.28154E-01	.13791E+01
.22033E-02	.98389E+00	.42416E-01	.39228E-01	.27789E-01	.13702E+01
.23568E-02	.98387E+00	.43043E-01	.41752E-01	.27402E-01	.13576E+01
.25104E-02	.98288E+00	.43623E-01	.49638E-01	.27236E-01	.13488E+01
.26639E-02	.98379E+00	.44093E-01	.47873E-01	.27402E-01	.13323E+01
.28175E-02	.98359E+00	.45869E-01	.65944E-01	.27373E-01	.13207E+01
.29710E-02	.98334E+00	.47375E-01	.74046E-01	.26611E-01	.13104E+01
.31207E-02	.98308E+00	.48990E-01	.81949E-01	.25898E-01	.13102E+01
.32551E-02	.96262E+00	.50614E-01	.88975E-01	.25447E-01	.13025E+01
.33740E-02	.98223E+00	.52130E-01	.95228E-01	.25214E-01	.12958E+01
.35315E-02	.98188E+00	.53691E-01	.10082E+00	.25044E-01	.12900E+01
.35775E-02	.98147E+00	.54898E-01	.10581E+00	.24873E-01	.12846E+01
.36656E-02	.98110E+00	.56136E-01	.11033E+00	.24756E-01	.12799E+01
.37664E-02	.98077E+00	.57138E-01	.11444E+00	.24624E-01	.12794E+01
.38193E-02	.98046E+00	.58122E-01	.11795E+00	.24561E-01	.12716E+01
.38846E-02	.98022E+00	.58729E-01	.12094E+00	.24457E-01	.12679E+01
.39437E-02	.97999E+00	.59498E-01	.12334E+00	.24373E-01	.12656E+01
.39974E-02	.97990E+00	.59394E-01	.12519E+00	.24317E-01	.12623E+01

.40473E-02	.97964E+00	.60584E-01	.12625E+00	.24616E-01	.17635E+01
.40934E-02	.98017E+00	.57195E-01	.12780E+00	.23638E-01	.12543E+01
.15069E-04	.12552E-01	.13652E-04	.25614E-02	.27788E-01	.55933E+01
.33544E-04	.26201E-01	.61399E-04	.25644E-02	.27795E-01	.55754E+01
.52677E-04	.48913E-01	.14887E-03	.80792E-02	.27807E-01	.56437E+01
.73655E-04	.56959E-01	.28258E-03	.11032E-01	.27819E-01	.57322E+01
.97409E-04	.74596E-01	.47774E-03	.14136E-01	.27831E-01	.57841E+01
.12355E-03	.93772E-01	.74716E-03	.17341E-01	.27836E-01	.58562E+01
.15170E-03	.11444E+00	.10929E-02	.20598E-01	.27898E-01	.59272E+01
.16727E-03	.12568E+00	.13061E-02	.22200E-01	.27859E-01	.59688E+01
.18204E-03	.13684E+00	.15949E-02	.23892E-01	.27869E-01	.60309E+01
.23001E-03	.14966E+00	.18031E-02	.25587E-01	.27872E-01	.60829E+01
.21717E-03	.16120E+00	.20882E-02	.27200E-01	.27881E-01	.60943E+01
.25518E-03	.18772E+00	.27596E-02	.30479E-01	.27885E-01	.61232E+01
.29702E-03	.21662E+00	.36022E-02	.33662E-01	.27907E-01	.61769E+01
.34333E-03	.24809E+00	.45941E-02	.36682E-01	.27987E-01	.62198E+01
.39443E-03	.28238E+00	.57750E-02	.39443E-01	.27927E-01	.62495E+01
.45072E-03	.31944E+00	.71449E-02	.41836E-01	.27923E-01	.62615E+01
.51260E-03	.35967E+00	.87365E-02	.43741E-01	.27926E-01	.62814E+01
.58855E-03	.40593E+00	.10650E-01	.45888E-01	.27932E-01	.63109E+01
.66430E-03	.45601E+00	.12858E-01	.45559E-01	.27935E-01	.63013E+01
.75213E-03	.51048E+00	.15341E-01	.45014E-01	.27893E-01	.58104E+01
.84874E-03	.56936E+00	.18169E-01	.43292E-01	.27866E-01	.55448E+01
.95413E-03	.63238E+00	.21308E-01	.40348E-01	.27836E-01	.51917E+01
.10699E-02	.69962E+00	.24919E-01	.35996E-01	.27738E-01	.47321E+01
.11973E-02	.77671E+00	.28991E-01	.30442E-01	.27646E-01	.41886E+01
.13374E-02	.84349E+00	.33935E-01	.23966E-01	.27519E-01	.34340E+01
.14915E-02	.91232E+00	.39516E-01	.17395E-01	.27344E-01	.26181E+01
.16726E-02	.96237E+00	.44898E-01	.12720E-01	.27183E-01	.18808E+01
.18117E-02	.98376E+00	.47754E-01	.11793E-01	.26691E-01	.14496E+01
.19717E-02	.98574E+00	.48350E-01	.14640E-01	.26260E-01	.13340E+01
.21316E-02	.98460E+00	.48195E-01	.19806E-01	.25829E-01	.13411E+01
.22915E-02	.98547E+00	.48216E-01	.25462E-01	.25826E-01	.13302E+01
.24512E-02	.98569E+00	.48091E-01	.31604E-01	.25805E-01	.13153E+01
.26109E-02	.98584E+00	.48010E-01	.38818E-01	.24881E-01	.13449E+01
.27706E-02	.98603E+00	.50778E-01	.44399E-01	.24211E-01	.12930E+01
.29303E-02	.98605E+00	.52001E-01	.50879E-01	.23819E-01	.12020E+01
.31 99E-02	.98605E+00	.53720E-01	.57327E-01	.23461E-01	.12714E+01
.33 36E-02	.98595E+00	.55469E-01	.63671E-01	.23095E-01	.12615E+01
.33544E-02	.98581E+00	.57245E-01	.69312E-01	.22807E-01	.12531E+01
.35914E-02	.98565E+00	.58692E-01	.74336E-01	.22532E-01	.12457E+01
.36 19E-02	.98547E+00	.60461E-01	.78822E-01	.22315E-01	.12392E+01

33140E-02	98786E+00	56574E-01	34587E-01	22185E-01	12406E+01
33783E-02	98805E+00	56289E-01	39091E-01	21719E-01	12372E+01
33304E-02	98817E+00	60128E-01	43536E-01	21321E-01	12267E+01
34522E-02	98823E+00	61976E-01	47485E-01	21000E-01	12177E+01
35095E-02	98826E+00	63696E-01	51130E-01	20692E-01	12099E+01
37244E-02	98828E+00	65314E-01	54191E-01	20412E-01	12030E+01
38271E-02	98826E+00	66752E-01	56963E-01	20196E-01	11967E+01
39215E-02	98825E+00	68059E-01	59508E-01	19994E-01	11910E+01
40078E-02	98827E+00	69380E-01	62012E-01	19792E-01	11852E+01
41556E-02	98831E+00	70739E-01	65478E-01	19484E-01	11750E+01
42186E-02	98834E+00	71293E-01	68832E-01	19393E-01	11720E+01
42763E-02	98843E+00	71353E-01	67854E-01	19249E-01	11681E+01
43297E-02	98836E+00	72088E-01	68461E-01	19345E-01	11672E+01
43790E-02	98952E+00	68156E-01	64938E-01	18839E-01	11501E+01
0.	0.	0.	0.	0.	0.
16703E-04	12590E-01	14288E-04	37558E-03	25545E-01	55093E+01
35076E-04	26201E-01	64494E-04	17999E-02	25554E-01	55743E+01
55120E-04	41030E-01	15421E-03	27622E-02	25574E-01	57098E+01
77251E-04	57134E-01	29787E-03	37724E-02	25590E-01	57795E+01
10189E-03	74028E-01	50246E-03	46346E-02	25595E-01	58095E+01
12003E-03	94658E-01	78421E-03	59316E-02	25617E-01	59208E+01
15668E-03	11470E+00	11510E-02	70463E-02	25617E-01	59808E+01
17496E-03	12605E+00	13761E-02	76238E-02	25620E-01	60224E+01
19125E-03	13724E+00	16170E-02	81753E-02	25629E-01	60533E+01
20921E-03	14950E+00	19013E-02	87564E-02	25638E-01	61046E+01
22716E-03	16166E+00	22031E-02	93891E-02	25641E-01	61128E+01
26683E-03	18624E+00	29251E-02	10432E-01	25662E-01	61640E+01
31068E-03	21718E+00	38097E-02	11525E-01	25660E-01	62866E+01
35911E-03	24808E+00	48664E-02	12563E-01	25679E-01	62548E+01
41256E-03	28298E+00	61294E-02	13507E-01	25678E-01	62449E+01
47144E-03	32892E+00	76007E-02	14320E-01	25682E-01	62321E+01
53617E-03	36019E+00	93204E-02	14981E-01	25684E-01	61596E+01
61175E-03	40635E+00	11410E-01	15438E-01	25685E-01	61076E+01
64484E-03	45625E+00	13826E-01	15599E-01	25629E-01	59757E+01
76671E-03	51847E+00	16577E-01	15487E-01	25609E-01	57826E+01
88776E-03	56984E+00	19746E-01	14889E-01	25552E-01	55157E+01
99008E-03	63181E+00	23313E-01	13776E-01	25503E-01	51627E+01
11191E-02	69654E+00	27457E-01	12290E-01	25410E-01	47851E+01
12523E-02	76929E+00	32236E-01	10377E-01	25323E-01	41262E+01
13989E-02	84196E+00	37902E-01	81461E-02	25183E-01	34173E+01
15581E-02	91122E+00	44362E-01	58730E-02	24992E-01	26853E+01
17275E-02	96240E+00	50640E-01	43266E-02	24709E-01	18619E+01

.16950E-02	.90484E+00	.54151E-01	.30006E-02	.26277E-01	.14174E+01
.21624E-02	.98721E+00	.55020E-01	.47644E-02	.23814E-01	.12928E+01
.22299E-02	.90615E+00	.34988E-01	.69181E-02	.23321E-01	.12979E+01
.23469E-02	.98729E+00	.55064E-01	.64711E-02	.22878E-01	.12843E+01
.23639E-02	.98775E+00	.55828E-01	.10628E-01	.22421E-01	.12667E+01
.27309E-02	.98815E+00	.36827E-01	.12390E-01	.21979E-01	.12549E+01
.28980E-02	.98863E+00	.57889E-01	.15166E-01	.21551E-01	.12409E+01
.31650E-02	.98895E+00	.59304E-01	.17490E-01	.21116E-01	.12286E+01
.33320E-02	.98928E+00	.61033E-01	.19338E-01	.20713E-01	.12168E+01
.33949E-02	.98954E+00	.62939E-01	.22100E-01	.20296E-01	.12059E+01
.35410E-02	.98974E+00	.64821E-01	.24136E-01	.19959E-01	.11966E+01
.36703E-02	.98989E+00	.66872E-01	.25994E-01	.19628E-01	.11889E+01
.37674E-02	.99002E+00	.68207E-01	.27575E-01	.19359E-01	.11813E+01
.38910E-02	.99014E+00	.69658E-01	.29026E-01	.19088E-01	.11747E+01
.40755E-02	.99029E+00	.70958E-01	.30338E-01	.18869E-01	.11689E+01
.42599E-02	.99049E+00	.72050E-01	.31520E-01	.18640E-01	.11628E+01
.44239E-02	.99062E+00	.73372E-01	.33413E-01	.18289E-01	.11524E+01
.46290E-02	.99073E+00	.74050E-01	.34113E-01	.18169E-01	.11481E+01
.48486E-02	.99080E+00	.74143E-01	.34636E-01	.18027E-01	.11440E+01
.50823E-02	.99092E+00	.74514E-01	.34959E-01	.18028E-01	.11418E+01
.54530E-02	.99234E+00	.67481E-01	.35211E-01	.16559E-01	.11213E+01
.16796E-04	.12597E-01	.14386E-04	.22789E-15	.23280E-01	.59741E+01
.35272E-04	.26295E-01	.64953E-04	.47625E-16	.25380E-01	.56411E+01
.55427E-04	.41061E-01	.18531E-03	.74483E-16	.25287E-01	.57094E+01
.77662E-04	.57165E-01	.29319E-03	.10389E-15	.25324E-01	.57790E+01
.10246E-03	.74865E-01	.50625E-03	.13636E-15	.25320E-01	.58404E+01
.12975E-03	.94109E-01	.78483E-03	.17191E-15	.25358E-01	.59281E+01
.15956E-03	.11488E+00	.11992E-02	.21098E-15	.25392E-01	.59879E+01
.17594E-03	.12612E+00	.13860E-02	.23170E-15	.25310E-01	.60214E+01
.19232E-03	.13732E+00	.16795E-02	.25297E-15	.25362E-01	.60523E+01
.21037E-03	.14957E+00	.19111E-02	.27638E-15	.25371E-01	.60839E+01
.22643E-03	.16174E+00	.22192E-02	.29988E-15	.25374E-01	.61116E+01
.26832E-03	.16633E+00	.23466E-02	.35288E-15	.25395E-01	.61634E+01
.31241E-03	.21729E+00	.38382E-02	.41089E-15	.25392E-01	.62031E+01
.36112E-03	.24679E+00	.49038E-02	.47711E-15	.25411E-01	.62330E+01
.41487E-03	.28302E+00	.61766E-02	.55341E-15	.25401E-01	.62429E+01
.47407E-03	.32014E+00	.76006E-02	.64233E-15	.25413E-01	.62298E+01
.53916E-03	.36031E+00	.93962E-02	.74793E-15	.25394E-01	.61880E+01
.61516E-03	.40646E+00	.11507E-01	.88501E-15	.25394E-01	.61047E+01
.69872E-03	.49634E+00	.13949E-01	.10387E-14	.25397E-01	.59742E+01
.79110E-03	.51854E+00	.16734E-01	.12696E-14	.25337E-01	.57790E+01

.09272E-03	.56907E+00	.19944E-01	-.16194E-14	.25278E-01	.55118E+01
.10036E-02	.63160E+00	.23564E-01	-.20733E-14	.25228E-01	.51567E+01
.11253E-02	.69648E+00	.27779E-01	-.27963E-14	.25148E-01	.47813E+01
.12593E-02	.76918E+00	.32634E-01	-.40190E-14	.25045E-01	.44220E+01
.14067E-02	.84183E+00	.38399E-01	-.62143E-14	.24903E-01	.41447E+01
.15688E-02	.91132E+00	.44971E-01	-.11219E-13	.24711E-01	.38031E+01
.17371E-02	.96242E+00	.51374E-01	-.22401E-13	.24425E-01	.34891E+01
.19055E-02	.98498E+00	.54863E-01	-.47129E-13	.23989E-01	.31432E+01
.20739E-02	.98738E+00	.55869E-01	-.96598E-13	.23519E-01	.28072E+01
.22423E-02	.98634E+00	.55830E-01	-.17288E-12	.23022E-01	.24822E+01
.24103E-02	.98751E+00	.55940E-01	-.26135E-12	.22575E-01	.21787E+01
.25782E-02	.98801E+00	.56114E-01	-.39788E-12	.22113E-01	.18687E+01
.27462E-02	.98844E+00	.57321E-01	-.46073E-12	.21667E-01	.15482E+01
.29141E-02	.98895E+00	.58793E-01	-.56976E-12	.21234E-01	.12344E+01
.30821E-02	.98922E+00	.60218E-01	-.68719E-12	.20794E-01	.12219E+01
.32501E-02	.98970E+00	.61879E-01	-.81307E-12	.20385E-01	.12100E+01
.34188E-02	.99000E+00	.63873E-01	-.94721E-12	.19961E-01	.11949E+01
.35888E-02	.99025E+00	.65764E-01	-.10770E-11	.19614E-01	.11895E+01
.36918E-02	.99045E+00	.67522E-01	-.12019E-11	.19279E-01	.11813E+01
.38065E-02	.99063E+00	.69159E-01	-.13223E-11	.18998E-01	.11740E+01
.39135E-02	.99079E+00	.70688E-01	-.14376E-11	.18724E-01	.11674E+01
.40181E-02	.99094E+00	.71899E-01	-.15497E-11	.18489E-01	.11611E+01
.41983E-02	.99110E+00	.72982E-01	-.16578E-11	.18258E-01	.11552E+01
.43788E-02	.99126E+00	.73868E-01	-.17592E-11	.18078E-01	.11497E+01
.44249E-02	.99142E+00	.74472E-01	-.18523E-11	.17891E-01	.11445E+01
.43141E-02	.99157E+00	.74919E-01	-.19376E-11	.17761E-01	.11400E+01
.43729E-02	.99173E+00	.75022E-01	-.20183E-11	.17620E-01	.11357E+01
.44275E-02	.99182E+00	.75226E-01	-.20729E-11	.17582E-01	.11330E+01
.44779E-02	.99334E+00	.67750E-01	-.21221E-11	.16959E-01	.11111E+01
.46088E-01	.41808E-01	.42888E-01	.43388E-01	.44888E-01	.45888E-01
.46000E-11	.47800E-01	.48000E-01	.49800E-01	.50000E-01	

SOLUTION AT X = .40000E-01

AT FI = 0.00 CFINE = .22421E-01 STINF = .10158E+00 SHOCK DISTANCE = .18226E-02

Y	U	V	W	P	H	H TOTAL
0.	0.	0.	0.	.13499E+00	.55093E+01	.55093E+01
.68363E-05	.16511E-01	-.14453E-04	-.65041E-68	.13097E+00	.56204E+01	.56239E+01
.14256E-04	.38378E-01	-.95701E-04	-.13225E-67	.13893E+00	.57347E+01	.57498E+01
.22560E-04	.53551E-01	-.11051E-03	-.21006E-67	.13893E+00	.58506E+01	.58823E+01
.31618E-04	.74374E-01	-.21375E-03	-.29025E-67	.13890E+00	.59683E+01	.60391E+01
.41703E-04	.97173E-01	-.36486E-03	-.37613E-67	.13888E+00	.60877E+01	.62086E+01
.52011E-04	.12184E+00	-.57415E-03	-.46615E-67	.13885E+00	.62056E+01	.63357E+01
.64944E-04	.14842E+00	-.85010E-03	-.55823E-67	.13883E+00	.63191E+01	.65011E+01
.71611E-04	.16283E+00	-.11821E-02	-.65872E-67	.13881E+00	.63750E+01	.67144E+01
.78278E-04	.17713E+00	-.12064E-02	-.65090E-67	.13880E+00	.64264E+01	.68280E+01
.85625E-04	.19277E+00	-.14251E-02	-.69791E-67	.13878E+00	.64781E+01	.69538E+01
.92976E-04	.20829E+00	-.16591E-02	-.74832E-67	.13877E+00	.65240E+01	.70800E+01
.10921E-03	.24218E+00	-.22256E-02	-.82749E-67	.13873E+00	.66095E+01	.73603E+01
.12716E-03	.27905E+00	-.29251E-02	-.90253E-67	.13872E+00	.66758E+01	.76726E+01
.14608E-03	.31915E+00	-.37731E-02	-.98811E-67	.13868E+00	.67178E+01	.80203E+01
.16866E-03	.36269E+00	-.47895E-02	-.99173E-67	.13867E+00	.67248E+01	.84089E+01
.19296E-03	.41983E+00	-.59814E-02	-.98282E-67	.13864E+00	.66895E+01	.88399E+01
.21905E-03	.48065E+00	-.73607E-02	-.97799E-67	.13864E+00	.65998E+01	.93166E+01
.25038E-03	.51858E+00	-.90135E-02	-.82376E-67	.13864E+00	.64308E+01	.98741E+01
.28439E-03	.58030E+00	-.10845E-01	-.64159E-67	.13867E+00	.61710E+01	.10483E+02
.32199E-03	.64562E+00	-.12001E-01	-.97199E-67	.13878E+00	.58025E+01	.11140E+02
.36336E-03	.71305E+00	-.14805E-01	-.94423E-68	.13867E+00	.53154E+01	.11826E+02
.40849E-03	.77977E+00	-.16733E-01	-.80882E-67	.13885E+00	.47150E+01	.12502E+02
.45802E-03	.84234E+00	-.18413E-01	-.84132E-67	.13895E+00	.40275E+01	.13114E+02
.51256E-03	.89485E+00	-.19914E-01	-.53112E-67	.13901E+00	.33245E+01	.13579E+02
.57266E-03	.93053E+00	-.21556E-01	.43963E-67	.13901E+00	.27343E+01	.13824E+02
.63933E-03	.94860E+00	-.23865E-01	.24074E-67	.13888E+00	.23850E+01	.13862E+02
.70704E-03	.94833E+00	-.26883E-01	.11682E-67	.13860E+00	.22954E+01	.13816E+02
.77558E-03	.94591E+00	-.30499E-01	.74311E-68	.13811E+00	.23244E+01	.13732E+02
.84412E-03	.94419E+00	-.34437E-01	.59732E-68	.13752E+00	.23098E+01	.13790E+02
.91266E-03	.94286E+00	-.38344E-01	.50643E-68	.13680E+00	.24021E+01	.13790E+02
.98104E-03	.94136E+00	-.42334E-01	.45879E-68	.13600E+00	.24324E+01	.13795E+02
.10494E-02	.93999E+00	-.46323E-01	.43885E-68	.13509E+00	.24816E+01	.13799E+02
.11178E-02	.93861E+00	-.50388E-01	.34991E-68	.13408E+00	.24980E+01	.13799E+02

Y	U	V	W	P	H	H TOTAL
.1182E-02	.9372E+00	-.5443E-01	.2854E-58	.1330E+00	.2518E+01	.1380E+02
.1254E-02	.9353E+00	-.5855E-01	.2218E-68	.1310E+00	.2505E+01	.1380E+02
.1329E-02	.9344E+00	-.6267E-01	.1652E-68	.1305E+00	.2529E+01	.1380E+02
.1389E-02	.9339E+00	-.6671E-01	.1186E-68	.1291E+00	.2596E+01	.1380E+02
.1443E-02	.9319E+00	-.7033E-01	.8476E-69	.1279E+00	.2628E+01	.1380E+02
.1502E-02	.9308E+00	-.7397E-01	.6019E-69	.1267E+00	.2639E+01	.1380E+02
.1551E-02	.9294E+00	-.7647E-01	.4196E-69	.1256E+00	.2655E+01	.1380E+02
.1592E-02	.9291E+00	-.7909E-01	.2880E-69	.1245E+00	.2669E+01	.1380E+02
.1632E-02	.9284E+00	-.8146E-01	.1945E-69	.1238E+00	.2681E+01	.1380E+02
.1668E-02	.9276E+00	-.8367E-01	.1234E-69	.1235E+00	.2690E+01	.1380E+02
.1705E-02	.9273E+00	-.8561E-01	.8713E-70	.1217E+00	.2698E+01	.1380E+02
.1729E-02	.9269E+00	-.8742E-01	.6014E-70	.1208E+00	.2704E+01	.1380E+02
.1755E-02	.9265E+00	-.8894E-01	.4342E-70	.1201E+00	.2709E+01	.1380E+02
.1779E-02	.9262E+00	-.9048E-01	.3014E-70	.1193E+00	.2712E+01	.1380E+02
.1802E-02	.9264E+00	-.9165E-01	.1968E-70	.1188E+00	.2715E+01	.1380E+02
.1822E-02	.9258E+00	-.9317E-01	.J.	.1178E+00	.2716E+01	.1380E+02

AT FI = 120.00 CTIME = .05747E-02 STIME = .3200E-01 SHOCK DISTANCE = .36703E-02

Y	U	V	W	P	H	H TOTAL
.1376E-04	.1271E-01	.1070E-04	.4617E-02	.3636E-01	.5509E+01	.5509E+01
.2691E-04	.2653E-01	.4754E-04	.9484E-02	.3637E-01	.5580E+01	.5580E+01
.5431E-04	.4243E-01	.1134E-03	.1452E-01	.3639E-01	.5563E+01	.5563E+01
.6367E-04	.5767E-01	.2176E-03	.1986E-01	.3639E-01	.5728E+01	.5728E+01
.8398E-04	.7552E-01	.3670E-03	.2544E-01	.3640E-01	.5804E+01	.5804E+01
.1363E-03	.9492E-01	.5786E-03	.3123E-01	.3641E-01	.5981E+01	.5981E+01
.1307E-03	.1154E+00	.8332E-03	.3704E-01	.3643E-01	.6031E+01	.6031E+01
.1421E-03	.1272E+00	.9945E-03	.4083E-01	.3644E-01	.6088E+01	.6088E+01
.1576E-03	.1382E+00	.1165E-02	.4236E-01	.3644E-01	.6182E+01	.6182E+01
.1724E-03	.1503E+00	.1367E-02	.4503E-01	.3645E-01	.6316E+01	.6316E+01
.1872E-03	.1632E+00	.1579E-02	.4889E-01	.3646E-01	.6467E+01	.6467E+01
.2199E-03	.1986E+00	.2084E-02	.5476E-01	.3648E-01	.6725E+01	.6725E+01
.2580E-03	.2194E+00	.2693E-02	.6448E-01	.3649E-01	.6727E+01	.6727E+01
.2959E-03	.2513E+00	.3414E-02	.8387E-01	.3651E-01	.7170E+01	.7170E+01
.3480E-03	.2861E+00	.4257E-02	.7083E-01	.3652E-01	.7434E+01	.7434E+01
.3885E-03	.3240E+00	.5218E-02	.7587E-01	.3654E-01	.7733E+01	.7733E+01
.4419E-03	.3659E+00	.6310E-02	.7845E-01	.3655E-01	.8061E+01	.8061E+01
.5042E-03	.4132E+00	.7593E-02	.8082E-01	.3657E-01	.8454E+01	.8454E+01

.57270E-03	.46390E+00	.90134E-02	.78184E-01	.36579E-01	.60653E+01	.89027E+01
.64842E-03	.51934E+00	.10553E-01	.81629E-01	.36589E-01	.58701E+01	.94071E+01
.73172E-03	.57961E+00	.12226E-01	.77302E-01	.36579E-01	.55954E+01	.97435E+01
.82260E-03	.64390E+00	.14006E-01	.72109E-01	.36574E-01	.52276E+01	.70504E+02
.92235E-03	.71231E+00	.15970E-01	.64367E-01	.36542E-01	.47470E+01	.11290E+02
.10322E-02	.78815E+00	.18182E-01	.54451E-01	.36505E-01	.41379E+01	.12845E+02
.11550E-02	.85593E+00	.20815E-01	.43083E-01	.36424E-01	.34803E+01	.12798E+02
.12659E-02	.92053E+00	.23915E-01	.31908E-01	.36333E-01	.25860E+01	.13453E+02
.14238E-02	.98063E+00	.27707E-01	.25156E-01	.36169E-01	.19024E+01	.13813E+02
.15618E-02	.98063E+00	.27707E-01	.23032E-01	.35951E-01	.15455E+01	.13857E+02
.16999E-02	.98063E+00	.27710E-01	.31120E-01	.35718E-01	.14723E+01	.13795E+02
.18379E-02	.97890E+00	.27256E-01	.41638E-01	.35435E-01	.14069E+01	.13785E+02
.19758E-02	.97909E+00	.27028E-01	.50417E-01	.35181E-01	.14929E+01	.13795E+02
.21132E-02	.97853E+00	.27308E-01	.53629E-01	.34991E-01	.14767E+01	.13792E+02
.22509E-02	.97813E+00	.27599E-01	.70927E-01	.34845E-01	.14723E+01	.13793E+02
.23889E-02	.97790E+00	.28293E-01	.81102E-01	.34597E-01	.14662E+01	.13794E+02
.25262E-02	.97692E+00	.28966E-01	.91275E-01	.34155E-01	.14603E+01	.13794E+02
.26639E-02	.97617E+00	.29977E-01	.10135E+00	.33953E-01	.14541E+01	.13794E+02
.27981E-02	.97572E+00	.31019E-01	.11185E+00	.33743E-01	.14482E+01	.13795E+02
.29186E-02	.97448E+00	.32165E-01	.11992E+00	.33621E-01	.14430E+01	.13795E+02
.30253E-02	.97386E+00	.33186E-01	.12767E+00	.33491E-01	.14383E+01	.13796E+02
.31216E-02	.97280E+00	.34291E-01	.13400E+00	.33352E-01	.14342E+01	.13796E+02
.32077E-02	.97244E+00	.35141E-01	.14278E+00	.33350E-01	.14303E+01	.13797E+02
.32869E-02	.97143E+00	.36036E-01	.14630E+00	.33344E-01	.14271E+01	.13797E+02
.33592E-02	.97079E+00	.36777E-01	.15131E+00	.33288E-01	.14238E+01	.13798E+02
.34245E-02	.97018E+00	.37569E-01	.15575E+00	.33266E-01	.14214E+01	.13798E+02
.34830E-02	.96970E+00	.37943E-01	.15944E+00	.33276E-01	.14189E+01	.13799E+02
.35360E-02	.96925E+00	.38622E-01	.16236E+00	.33411E-01	.14177E+01	.13799E+02
.35842E-02	.96897E+00	.38450E-01	.16465E+00	.33237E-01	.14154E+01	.13799E+02
.36290E-02	.96863E+00	.39433E-01	.16500E+00	.33859E-01	.14169E+01	.13799E+02
.36703E-02	.96877E+00	.37627E-01	.16804E+00	.33298E-01	.14126E+01	.13800E+02

AT FI = 130.00 CFIMF = .80002E-02 STIME = .29192E-01 SHOCK DISTANCE = .38944E-02 M TOTAL

.14507E-04	.12601E-01	.12007E-04	.40173E-02	.32869E-01	.95093E+01	.55093E+01
.30676E-04	.26291E-01	.53621E-04	.82340E-02	.32670E-01	.55782E+01	.55804E+01
.48204E-04	.41004E-01	.12811E-03	.12606E-01	.32689E-01	.56493E+01	.56590E+01
.67568E-04	.57164E-01	.24615E-03	.17293E-01	.32712E-01	.57216E+01	.57492E+01
					.57953E+01	.58410E+01

.80109E-04	.74862E-01	.41566E-03	.21155E-01	.32717E-01	.56702E+01	.39482E+01
.11284E-03	.94144E-01	.64714E-03	.27117E-01	.32737E-01	.59445E+11	.60673E+01
.13877E-03	.11405E-00	.94741E-03	.32272E-01	.32741E-01	.60163E+01	.61983E+01
.15301E-03	.12633E+00	.11311E-02	.34908E-01	.32750E-01	.60518E+01	.62710E+01
.16726E-03	.13733E+00	.13276E-02	.37432E-01	.32750E-01	.60846E+01	.63440E+01
.18296E-03	.14968E+00	.15901E-02	.40386E-01	.32763E-01	.61170E+01	.64249E+01
.19366E-03	.16179E+00	.18022E-02	.42911E-01	.32768E-01	.61490E+01	.65063E+01
.20733E-03	.18044E+00	.23840E-02	.47739E-01	.32790E-01	.62039E+01	.66077E+01
.22170E-03	.21749E+00	.30909E-02	.57725E-01	.32795E-01	.62498E+01	.66920E+01
.23140E-03	.24555E+00	.39280E-02	.51451E-01	.32795E-01	.62821E+01	.67191E+01
.24681E-03	.26361E+00	.49163E-02	.61771E-01	.32821E-01	.62965E+01	.67352E+01
.261230E-03	.32105E+00	.60522E-02	.63516E-01	.32842E-01	.62881E+01	.66628E+01
.26690E-03	.35165E+00	.73555E-02	.68497E-01	.32842E-01	.62509E+01	.67958E+01
.25300E-03	.40841E+00	.89063E-02	.71595E-01	.32850E-01	.61721E+01	.63719E+01
.26876E-03	.45907E+00	.10609E-01	.71548E-01	.32888E-01	.60434E+01	.60073E+01
.27639E-03	.51422E+00	.12573E-01	.71501E-01	.32851E-01	.58517E+01	.59019E+01
.28282E-03	.57386E+00	.14708E-01	.67141E-01	.32826E-01	.58032E+01	.58601E+01
.29467E-03	.63747E+00	.17025E-01	.63146E-01	.32806E-01	.55241E+01	.54482E+02
.30786E-03	.70555E+00	.19626E-01	.58420E-01	.32755E-01	.47547E+01	.41172E+02
.31052E-02	.77700E+00	.25666E-01	.47763E-01	.32698E-01	.41583E+01	.41922E+02
.32234E-02	.84940E+00	.26040E-01	.37724E-01	.32602E-01	.34306E+01	.32692E+02
.33644E-02	.91641E+00	.30056E-01	.27749E-01	.32471E-01	.26120E+01	.13384E+02
.35107E-02	.96303E+00	.33817E-01	.21089E-01	.32264E-01	.19011E+01	.13792E+02
.36572E-02	.98197E+00	.35547E-01	.20390E-01	.31972E-01	.13085E+01	.13463E+02
.38047E-02	.98260E+00	.35714E-01	.25452E-01	.31669E-01	.14161E+01	.13799E+02
.39501E-02	.98133E+00	.35380E-01	.33255E-01	.31317E-01	.14278E+01	.13785E+02
.40962E-02	.98172E+00	.35280E-01	.32281E-01	.31003E-01	.14212E+01	.13798E+02
.42422E-02	.98151E+00	.35720E-01	.51485E-01	.30665E-01	.14116E+01	.13793E+02
.43844E-02	.98124E+00	.36221E-01	.60882E-01	.30347E-01	.14048E+01	.13733E+02
.45344E-02	.98090E+00	.37114E-01	.70193E-01	.30041E-01	.13963E+01	.13794E+02
.46805E-02	.98032E+00	.38097E-01	.79546E-01	.29729E-01	.13803E+01	.13794E+02
.48266E-02	.98002E+00	.39390E-01	.88825E-01	.29475E-01	.13822E+01	.13795E+02
.49690E-02	.97971E+00	.40790E-01	.97902E-01	.29208E-01	.13720E+01	.13795E+02
.50968E-02	.97879E+00	.42196E-01	.10597E+00	.28820E-01	.13660E+01	.13795E+02
.52100E-02	.97818E+00	.43504E-01	.11314E+00	.2837E-01	.13601E+01	.13795E+02
.53122E-02	.97750E+00	.44807E-01	.11959E+00	.28212E-01	.13502E+01	.13795E+02
.54035E-02	.97702E+00	.45937E-01	.12527E+00	.28595E-01	.13504E+01	.13797E+02
.54876E-02	.97646E+00	.47061E-01	.13145E+00	.28533E-01	.13463E+01	.13797E+02
.55643E-02	.97596E+00	.47993E-01	.13312E+00	.28441E-01	.13424E+01	.13798E+02
.56336E-02	.97549E+00	.48866E-01	.13317E+00	.28436E-01	.13393E+01	.13798E+02
.56957E-02	.97511E+00	.49380E-01	.14260E+00	.28356E-01	.13361E+01	.13798E+02
.57519E-02	.97475E+00	.50124E-01	.14533E+00	.28346E-01	.13344E+01	.13799E+02
.58031E-02	.97456E+00	.50808E-01	.14746E+00	.28275E-01	.13317E-01	.13799E+02

.38505E-02
 .38944E-02
 .97425E+00
 .97455E+00
 .51153E-01
 .48703E-01
 .14369E+00
 .14949E+00
 .28641E+01
 .27827E-01
 .13331E+01
 .13269E+01
 .13799E+02
 .13800E+02

AT FT = 140.00 CTIME = .75911E-02 SFINF = .27127E-01 SMOCK DISTANCE = .40934E-02

Y	U	V	H	P	H	H TOTAL
0.	0.	0.	0.			
.15354E-04	.12555E-01	.12974E-04	.33262E-02	.29852E-01	.55093E+01	.55093E+01
.32243E-04	.26204E-01	.58173E-04	.68347E-02	.29862E-01	.55766E+01	.55766E+01
.50688E-04	.40910E-01	.13905E-03	.10489E-01	.29873E-01	.56460E+01	.56554E+01
.71012E-04	.56969E-01	.26748E-03	.14323E-01	.29897E-01	.57166E+01	.57394E+01
.93662E-04	.74602E-01	.45193E-03	.18351E-01	.29902E-01	.57887E+01	.58329E+01
.11861E-03	.93780E-01	.70453E-03	.22511E-01	.29923E-01	.58619E+01	.59375E+01
.14506E-03	.11445E+00	.10226E-02	.26736E-01	.29929E-01	.59345E+01	.60536E+01
.16083E-03	.12569E+00	.12336E-02	.28922E-01	.29935E-01	.60395E+01	.62524E+01
.17501E-03	.13686E+00	.14490E-02	.31114E-01	.29930E-01	.60716E+01	.63237E+01
.19231E-03	.14938E+00	.17014E-02	.35215E-01	.29948E-01	.61040E+01	.64026E+01
.20882E-03	.16123E+00	.19696E-02	.35309E-01	.29952E-01	.61334E+01	.64821E+01
.24528E-03	.18777E+00	.26095E-02	.39561E-01	.29974E-01	.62879E+01	.66593E+01
.26550E-03	.21670E+00	.33897E-02	.43898E-01	.29976E-01	.62324E+01	.68581E+01
.33011E-03	.24821E+00	.43169E-02	.47519E-01	.29980E-01	.62633E+01	.70611E+01
.37925E-03	.28249E+00	.54169E-02	.51205E-01	.29997E-01	.62765E+01	.73319E+01
.43336E-03	.31972E+00	.66881E-02	.56315E-01	.30015E-01	.62671E+01	.76139E+01
.49286E-03	.36007E+00	.81574E-02	.56792E-01	.30008E-01	.62290E+01	.79307E+01
.56234E-03	.40650E+00	.99204E-02	.58537E-01	.30019E-01	.61497E+01	.83099E+01
.63872E-03	.45680E+00	.11924E-01	.59167E-01	.30000E-01	.63212E+01	.87388E+01
.72317E-03	.51153E+00	.14164E-01	.58471E-01	.29994E-01	.58307E+01	.92263E+01
.81607E-03	.57072E+00	.16685E-01	.56247E-01	.29958E-01	.55647E+01	.97780E+01
.91742E-03	.63399E+00	.19462E-01	.52381E-01	.29925E-01	.52100E+01	.10295E+02
.10287E-02	.70161E+00	.22620E-01	.46803E-01	.29864E-01	.47471E+01	.11083E+02
.11512E-02	.77290E+00	.26213E-01	.39612E-01	.29787E-01	.41588E+01	.11834E+02
.12859E-02	.84961E+00	.30494E-01	.31238E-01	.29687E-01	.34386E+01	.12616E+02
.14341E-02	.91300E+00	.35317E-01	.22423E-01	.29515E-01	.26209E+01	.13332E+02
.15879E-02	.96254E+00	.39959E-01	.16950E-01	.29277E-01	.18926E+01	.13776E+02
.17419E-02	.98260E+00	.42266E-01	.13906E-01	.28927E-01	.14763E+01	.13666E+02
.18958E-02	.98440E+00	.42689E-01	.19301E-01	.28562E-01	.13760E+01	.13802E+02
.20490E-02	.98319E+00	.42457E-01	.26647E-01	.28154E-01	.13791E+01	.13785E+02
.22033E-02	.98595E+00	.42410E-01	.33326E-01	.27789E-01	.13702E+01	.13798E+02
.23568E-02	.98387E+00	.43003E-01	.41752E-01	.27402E-01	.13576E+01	.13794E+02

.25104E-02	.98382E+00	.47633E-01	.49835E-01	.27036E-01	.13486E+01	.13794E+02
.26639E-02	.98379E+00	.46693E-01	.57870E-01	.26681E-01	.13383E+01	.13795E+02
.28175E-02	.98358E+00	.45869E-01	.65981E-01	.26328E-01	.13287E+01	.13795E+02
.29710E-02	.98334E+00	.47375E-01	.74040E-01	.26012E-01	.13191E+01	.13795E+02
.31207E-02	.98308E+00	.48970E-01	.81949E-01	.25690E-01	.13102E+01	.13795E+02
.32586E-02	.98282E+00	.50614E-01	.89375E-01	.25447E-01	.13025E+01	.13796E+02
.34115E-02	.98249E+00	.52130E-01	.95228E-01	.25214E-01	.12958E+01	.13796E+02
.35653E-02	.98218E+00	.53681E-01	.10032E+00	.25044E-01	.12900E+01	.13796E+02
.37464E-02	.98187E+00	.55356E-01	.10591E+00	.24873E-01	.12846E+01	.13797E+02
.39193E-02	.98158E+00	.57152E-01	.11333E+00	.24756E-01	.12799E+01	.13797E+02
.38445E-02	.98130E+00	.58729E-01	.12094E+00	.24624E-01	.12754E+01	.13797E+02
.39437E-02	.98103E+00	.59456E-01	.12795E+00	.24512E-01	.12718E+01	.13798E+02
.39974E-02	.97999E+00	.59456E-01	.12795E+00	.24473E-01	.12673E+01	.13798E+02
.40473E-02	.97954E+00	.59394E-01	.12819E+00	.24317E-01	.12623E+01	.13799E+02
.40934E-02	.98317E+00	.57195E-01	.12625E+00	.24616E-01	.12635E+01	.13799E+02
			.12700E+00	.23638E-01	.12543E+01	.13800E+02

AT FT = 150.00 CRIMP = .72971E-02 STIMP = .25618E-01 SHOCK DISTANCE = .42573E-02

Y	U	V	M	P	H	H TOTAL
---	---	---	---	---	---	---------

0.	0.	0.	0.	.27766E-01	.55023E+01	.55093E+01
.15609E-04	.12992E-01	.13632E-04	.29818E-02	.27792E-01	.55794E+01	.55775E+01
.33538E-04	.26241E-01	.51399E-04	.52642E-02	.27807E-01	.56437E+01	.56524E+01
.52696E-04	.40913E-01	.14680E-03	.80792E-02	.27815E-01	.57132E+01	.57355E+01
.73875E-04	.56992E-01	.28288E-03	.11932E-01	.27831E-01	.57841E+01	.58272E+01
.97412E-04	.74595E-01	.47774E-03	.16136E-01	.27836E-01	.58562E+01	.59000E+01
.12336E-03	.93772E-01	.74516E-03	.17341E-01	.27858E-01	.59277E+01	.60441E+01
.15176E-03	.11444E+00	.10922E-02	.21996E-01	.27899E-01	.59960E+01	.61699E+01
.16727E-03	.12560E+00	.13051E-02	.22200E-01	.27869E-01	.60309E+01	.62349E+01
.18285E-03	.13684E+00	.15349E-02	.23891E-01	.27872E-01	.60625E+01	.63095E+01
.20843E-03	.14966E+00	.18031E-02	.25507E-01	.27881E-01	.60943E+01	.63871E+01
.21710E-03	.16126E+00	.20822E-02	.27200E-01	.27895E-01	.61232E+01	.64653E+01
.25510E-03	.18772E+00	.27696E-02	.31476E-01	.27907E-01	.61765E+01	.65395E+01
.29782E-03	.21668E+00	.36022E-02	.33662E-01	.27907E-01	.62198E+01	.66391E+01
.34333E-03	.24809E+00	.45941E-02	.36682E-01	.27927E-01	.62494E+01	.67054E+01
.39443E-03	.28230E+00	.57750E-02	.39443E-01	.27923E-01	.62615E+01	.67301E+01
.49072E-03	.31942E+00	.71449E-02	.41836E-01	.27928E-01	.62507E+01	.67799E+01
.51265E-03	.35967E+00	.87365E-02	.43741E-01	.27926E-01	.62114E+01	.67927E+01

.56405E+03	.40593E+00	.10658E-01	.55800E-01	.27932E-01	.61309E+01	.82675E+01
.66430E+03	.45601E+00	.12852E-01	.45559E-01	.27905E-01	.60013E+01	.86917E+01
.75213E+03	.51048E+00	.15341E-01	.35218E-01	.27889E-01	.58104E+01	.91749E+01
.84874E+03	.56936E+00	.16165E-01	.43292E-01	.27866E-01	.55448E+01	.97224E+01
.95416E+03	.63230E+00	.21308E-01	.40314E-01	.27806E-01	.51917E+01	.10336E+02
.10699E+02	.69962E+00	.24919E-01	.39908E-01	.27798E-01	.47221E+01	.11022E+02
.11973E+02	.77071E+00	.29051E-01	.30449E-01	.27646E-01	.41408E+01	.11775E+02
.13374E+02	.84349E+00	.33935E-01	.23966E-01	.27519E-01	.34340E+01	.12563E+02
.14915E+02	.91232E+00	.39516E-01	.17995E-01	.27349E-01	.26181E+01	.13295E+02
.16515E+02	.96237E+00	.44808E-01	.12716E-01	.27043E-01	.18838E+01	.13763E+02
.18116E+02	.98376E+00	.47754E-01	.11739E-01	.26691E-01	.14966E+01	.13868E+02
.19717E+02	.98574E+00	.48390E-01	.14680E-01	.26280E-01	.13940E+01	.13804E+02
.21318E+02	.98460E+00	.48195E-01	.19036E-01	.25829E-01	.13411E+01	.13785E+02
.22916E+02	.98547E+00	.48216E-01	.25462E-01	.25426E-01	.13802E+01	.13799E+02
.24512E+02	.98569E+00	.48691E-01	.31818E-01	.25008E-01	.13133E+01	.13795E+02
.26109E+02	.98584E+00	.49610E-01	.38010E-01	.24601E-01	.13049E+01	.13795E+02
.27705E+02	.98603E+00	.50778E-01	.44399E-01	.24211E-01	.12930E+01	.13796E+02
.29303E+02	.98609E+00	.52081E-01	.50879E-01	.23819E-01	.12820E+01	.13795E+02
.30900E+02	.98605E+00	.53720E-01	.57327E-01	.23461E-01	.12744E+01	.13796E+02
.32456E+02	.98595E+00	.55489E-01	.63373E-01	.23095E-01	.12615E+01	.13796E+02
.33854E+02	.98581E+00	.57249E-01	.69312E-01	.22807E-01	.12531E+01	.13796E+02
.35092E+02	.98565E+00	.58892E-01	.74336E-01	.22532E-01	.12457E+01	.13796E+02
.36209E+02	.98547E+00	.60461E-01	.78822E-01	.22319E-01	.12392E+01	.13796E+02
.37207E+02	.98530E+00	.61895E-01	.82838E-01	.22102E-01	.12334E+01	.13797E+02
.38125E+02	.98512E+00	.63147E-01	.86465E-01	.21986E-01	.12281E+01	.13797E+02
.38964E+02	.98497E+00	.64231E-01	.89739E-01	.21767E-01	.12230E+01	.13797E+02
.39722E+02	.98483E+00	.65191E-01	.92583E-01	.21621E-01	.12186E+01	.13797E+02
.40401E+02	.98470E+00	.65837E-01	.94987E-01	.21521E-01	.12144E+01	.13798E+02
.41316E+02	.98464E+00	.66485E-01	.96917E-01	.21476E-01	.12113E+01	.13798E+02
.41375E+02	.98469E+00	.66889E-01	.98591E-01	.21329E-01	.12077E+01	.13798E+02
.42094E+02	.98447E+00	.67536E-01	.99243E-01	.21153E-01	.12000E+01	.13798E+02
.42573E+02	.98530E+00	.62932E-01	.99881E-01	.20368E-01	.11950E+01	.13800E+02

AT FI = 100.00 CPINF = .71098E+02 STINF = .28842E-01 SHOCK DISTANCE = .43790E-02

Y	U	V	W	P	M	TOTAL
0.	0.	0.	0.	.26371E-01	.55093E+01	.55893E+01
.16428E+04	.12572E-01	.14091E-04	.17401E-02	.26380E-01	.55747E+01	.55768E+01
.34493E+04	.26241E-01	.63504E-04	.35750E-02	.26392E-01	.56422E+01	.56512E+01

.54233E-04	.40977E-01	.15184E-03	.54877E-02	.26400E-01	.57110E+01	.57329E+01
.75966E-04	.57049E-01	.29244E-03	.74335E-02	.26416E-01	.57812E+01	.58236E+01
.19020E-03	.74713E-01	.49448E-03	.98319E-02	.26421E-01	.58525E+01	.59251E+01
.12686E-03	.93919E-01	.71154E-03	.11770E-01	.26433E-01	.59213E+01	.60320E+01
.15684E-03	.11462E+00	.11320E-02	.13988E-01	.26444E-01	.59917E+01	.61624E+01
.17205E-03	.12547E+00	.13532E-02	.15132E-01	.26453E-01	.60829E+01	.62311E+01
.18407E-03	.13705E+00	.15906E-02	.16226E-01	.26456E-01	.61566E+01	.63004E+01
.20572E-03	.14928E+00	.18690E-02	.17377E-01	.26465E-01	.62877E+01	.63773E+01
.22338E-03	.16143E+00	.21652E-02	.18472E-01	.26488E-01	.64165E+01	.64945E+01
.26239E-03	.18790E+00	.28734E-02	.20990E-01	.26490E-01	.66169E+01	.66870E+01
.30551E-03	.21690E+00	.37402E-02	.22859E-01	.26488E-01	.62115E+01	.65206E+01
.35314E-03	.24838E+00	.47744E-02	.24930E-01	.26488E-01	.62482E+01	.70381E+01
.42571E-03	.28259E+00	.60086E-02	.26770E-01	.26500E-01	.62511E+01	.72429E+01
.45360E-03	.31971E+00	.74439E-02	.28400E-01	.26514E-01	.62391E+01	.75585E+01
.52725E-03	.35969E+00	.91173E-02	.29888E-01	.26508E-01	.61985E+01	.78687E+01
.63157E-03	.40608E+00	.11146E-01	.30591E-01	.26501E-01	.61165E+01	.82408E+01
.68329E-03	.45604E+00	.13482E-01	.30908E-01	.26488E-01	.59856E+01	.86822E+01
.77353E-03	.51838E+00	.16134E-01	.30529E-01	.26491E-01	.59335E+01	.91427E+01
.87300E-03	.56945E+00	.19173E-01	.29349E-01	.26397E-01	.58272E+01	.96878E+01
.98143E-03	.63176E+00	.22586E-01	.27310E-01	.26351E-01	.51743E+01	.10299E+02
.11004E-02	.69882E+00	.26222E-01	.24377E-01	.26268E-01	.47101E+01	.10384E+02
.12315E-02	.76974E+00	.31453E-01	.20309E-01	.26178E-01	.41355E+01	.11737E+02
.13756E-02	.84244E+00	.38422E-01	.16193E-01	.26042E-01	.34244E+01	.12530E+02
.15342E-02	.91141E+00	.48254E-01	.11704E-01	.25637E-01	.19692E+01	.13755E+02
.16987E-02	.96230E+00	.48483E-01	.84724E-02	.25581E-01	.14295E+01	.1369E+02
.18634E-02	.98444E+00	.51734E-01	.77677E-02	.25163E-01	.14295E+01	.1369E+02
.20281E-02	.98604E+00	.52493E-01	.96194E-02	.24710E-01	.13882E+01	.13806E+02
.21928E-02	.98548E+00	.52397E-01	.13103E-01	.24241E-01	.13134E+01	.13785E+02
.23571E-02	.98661E+00	.52465E-01	.16964E-01	.23612E-01	.13015E+01	.13800E+02
.25213E-02	.98619E+00	.53196E-01	.21187E-01	.23367E-01	.12849E+01	.13796E+02
.26855E-02	.98739E+00	.53967E-01	.25826E-01	.22939E-01	.12734E+01	.13796E+02
.28497E-02	.98765E+00	.55197E-01	.30066E-01	.22525E-01	.12604E+01	.13797E+02
.30140E-02	.98706E+00	.56574E-01	.34582E-01	.22105E-01	.12485E+01	.13796E+02
.31763E-02	.98345E+00	.58289E-01	.39891E-01	.21719E-01	.12372E+01	.13796E+02
.33384E-02	.98877E+00	.60120E-01	.43536E-01	.21321E-01	.12267E+01	.13796E+02
.34322E-02	.98839E+00	.61976E-01	.47409E-01	.21080E-01	.12177E+01	.13796E+02
.36695E-02	.98835E+00	.63696E-01	.51003E-01	.20692E-01	.12099E+01	.13796E+02
.37244E-02	.98835E+00	.65314E-01	.54151E-01	.20441E-01	.12030E+01	.13796E+02
.38271E-02	.98835E+00	.66752E-01	.58963E-01	.20186E-01	.11967E+01	.13796E+02
.39215E-02	.98835E+00	.68059E-01	.53504E-01	.19944E-01	.11910E+01	.13797E+02
.40078E-02	.98835E+00	.69160E-01	.51831E-01	.19742E-01	.11855E+01	.13797E+02
.41857E-02	.98835E+00	.70892E-01	.63795E-01	.19639E-01	.11863E+01	.13797E+02
.41555E-02	.98835E+00	.70739E-01	.65478E-01	.19684E-01	.11758E+01	.13797E+02

.42188E-02	.98834E+00	.71293E-01	.66832E-01	.19395E-01	.11720E+01	.13747E+02
.42763E-02	.98843E+00	.71353E-01	.67854E-01	.19249E-01	.11681E+01	.13798E+02
.43297E-02	.98836E+00	.72088E-01	.68461E-01	.19386E-01	.11672E+01	.13797E+02
.43790E-02	.98852E+00	.66156E-01	.68938E-01	.18005E-01	.11501E+01	.13800E+02

AT FI = 170.60 CFIMP = .69975E-02 STIFF = .24085E-01 SHOCK DISTANCE = .44530E-02

Y	U	V	W	P	M	M TOTAL
---	---	---	---	---	---	---------

J.	0.	0.	0.	0.	0.	
.16703E-04	.12540E-01	.14268E-04	.67554E-03	.25845E-01	.55893E+01	.55893E+01
.39076E-04	.26211E-01	.84498E-04	.17993E-02	.25554E-01	.55743E+01	.55743E+01
.55119E-04	.41018E-01	.15421E-03	.27622E-02	.25958E-01	.58418E+01	.58418E+01
.77250E-04	.57114E-01	.29707E-03	.37724E-02	.25574E-01	.57998E+01	.57315E+01
.10189E-03	.74815E-01	.50248E-03	.48348E-02	.25590E-01	.57795E+01	.58215E+01
.12903E-03	.94018E-01	.78421E-03	.59316E-02	.25395E-01	.58505E+01	.59225E+01
.15867E-03	.11478E+00	.11510E-02	.70463E-02	.25617E-01	.59208E+01	.60344E+01
.17498E-03	.12615E+00	.13761E-02	.76230E-02	.25617E-01	.59888E+01	.61541E+01
.19125E-03	.13714E+00	.16178E-02	.81753E-02	.25629E-01	.60224E+01	.62265E+01
.20920E-03	.14950E+00	.19013E-02	.87569E-02	.25638E-01	.60533E+01	.62958E+01
.22716E-03	.16188E+00	.22031E-02	.93891E-02	.25638E-01	.60848E+01	.63717E+01
.26683E-03	.18424E+00	.29251E-02	.10432E-01	.25641E-01	.61128E+01	.64488E+01
.31067E-03	.21718E+00	.38097E-02	.11525E-01	.25662E-01	.61648E+01	.66199E+01
.35911E-03	.24688E+00	.48664E-02	.12968E-01	.25668E-01	.62068E+01	.68122E+01
.41256E-03	.28240E+00	.61294E-02	.13507E-01	.25678E-01	.62348E+01	.70237E+01
.47143E-03	.32002E+00	.76007E-02	.14324E-01	.25682E-01	.62321E+01	.75464E+01
.53618E-03	.36919E+00	.93293E-02	.14981E-01	.25687E-01	.61988E+01	.78932E+01
.61174E-03	.40635E+00	.11410E-01	.15438E-01	.25655E-01	.61876E+01	.82253E+01
.69483E-03	.45625E+00	.13826E-01	.15598E-01	.25629E-01	.59757E+01	.86458E+01
.78676E-03	.51047E+00	.16577E-01	.15407E-01	.25609E-01	.57828E+01	.91246E+01
.88776E-03	.56904E+00	.19746E-01	.14809E-01	.25552E-01	.55157E+01	.96552E+01
.99802E-03	.63161E+00	.23313E-01	.13776E-01	.25503E-01	.51627E+01	.10278E+02
.11190E-02	.69834E+00	.27437E-01	.12240E-01	.25418E-01	.47851E+01	.10963E+02
.12523E-02	.76929E+00	.32236E-01	.10377E-01	.25323E-01	.41262E+01	.11718E+02
.13989E-02	.84198E+00	.37982E-01	.81461E-02	.25124E-01	.34173E+01	.12518E+02
.15601E-02	.91122E+00	.44382E-01	.58738E-02	.24992E-01	.28853E+01	.13258E+02
.17274E-02	.96240E+00	.50648E-01	.42266E-02	.24799E-01	.18619E+01	.13750E+02
.18949E-02	.98484E+00	.54151E-01	.38438E-02	.24277E-01	.14174E+01	.13828E+02
.21624E-02	.98721E+00	.59020E-01	.47848E-02	.23818E-01	.12928E+01	.13887E+02
.22298E-02	.98615E+00	.54966E-01	.65181E-02	.23321E-01	.12975E+01	.13705E+02

.2396E-02	.98729E+00	.5506E-01	.04711E-02	.22070E-01	.12043E+01	.13601E+02
.25639E-02	.98775E+00	.55820E-01	.10620E-01	.22421E-01	.12667E+01	.13796E+02
.27309E-02	.98819E+00	.56627E-01	.12990E-01	.21979E-01	.12949E+01	.13796E+02
.28479E-02	.98863E+00	.57009E-01	.15166E-01	.21551E-01	.12409E+01	.13797E+02
.30650E-02	.98896E+00	.59344E-01	.17490E-01	.21116E-01	.12286E+01	.13796E+02
.32320E-02	.98928E+00	.61935E-01	.19808E-01	.20733E-01	.12188E+01	.13797E+02
.33940E-02	.98954E+00	.62939E-01	.22100E-01	.20286E-01	.12059E+01	.13796E+02
.35410E-02	.98974E+00	.64821E-01	.24136E-01	.19955E-01	.11966E+01	.13797E+02
.36705E-02	.98989E+00	.66572E-01	.25934E-01	.19628E-01	.11885E+01	.13796E+02
.37873E-02	.99002E+00	.68207E-01	.27575E-01	.19355E-01	.11813E+01	.13796E+02
.38917E-02	.99014E+00	.69650E-01	.29026E-01	.19088E-01	.11747E+01	.13796E+02
.39878E-02	.99025E+00	.70950E-01	.30380E-01	.18803E-01	.11686E+01	.13796E+02
.40755E-02	.99037E+00	.72050E-01	.31520E-01	.18640E-01	.11628E+01	.13797E+02
.41540E-02	.99049E+00	.72946E-01	.32540E-01	.18535E-01	.11574E+01	.13797E+02
.42258E-02	.99062E+00	.73972E-01	.33413E-01	.18283E-01	.11524E+01	.13797E+02
.42901E-02	.99073E+00	.74050E-01	.34113E-01	.18169E-01	.11491E+01	.13797E+02
.43486E-02	.99088E+00	.74143E-01	.34636E-01	.18027E-01	.11440E+01	.13797E+02
.44029E-02	.99098E+00	.74514E-01	.34935E-01	.18008E-01	.11418E+01	.13797E+02
.44530E-02	.99234E+00	.67481E-01	.35211E-01	.16555E-01	.11213E+01	.13800E+02

AT FX = 180.00 CFINF = .69625E-02 STINF = .23877E-01 SHOCK DISTANCE = .44779E-02

Y	U	V	M	P	M	M TOTAL
0.	0.	0.	0.	.25278E-01	.55093E+01	.55093E+01
.16796E-04	.12597E-01	.14386E-04	.22745E-16	.25288E-01	.55741E+01	.55741E+01
.35272E-04	.26295E-01	.64953E-04	.47625E-16	.25380E-01	.56421E+01	.56421E+01
.55427E-04	.41061E-01	.15531E-03	.74483E-16	.25307E-01	.57094E+01	.57094E+01
.77682E-04	.57165E-01	.29919E-03	.10389E-15	.25324E-01	.57790E+01	.57790E+01
.10245E-03	.74865E-01	.56882E-03	.13630E-15	.25350E-01	.58498E+01	.58498E+01
.12975E-03	.94169E-01	.78983E-03	.17191E-15	.25350E-01	.59201E+01	.59201E+01
.15956E-03	.11405E+00	.11592E-02	.21036E-15	.25350E-01	.59879E+01	.59879E+01
.17594E-03	.12612E+00	.13888E-02	.23176E-15	.25360E-01	.60214E+01	.60214E+01
.19232E-03	.13732E+00	.16295E-02	.25297E-15	.25362E-01	.60523E+01	.60523E+01
.21037E-03	.14957E+00	.19151E-02	.27630E-15	.25371E-01	.60834E+01	.60834E+01
.22843E-03	.16174E+00	.22192E-02	.29966E-15	.25374E-01	.61146E+01	.61146E+01
.24632E-03	.18833E+00	.29466E-02	.35204E-15	.25395E-01	.61634E+01	.61634E+01
.31241E-03	.21729E+00	.38380E-02	.41845E-15	.25392E-01	.62051E+01	.62051E+01
.36112E-03	.24679E+00	.49030E-02	.47711E-15	.25411E-01	.62330E+01	.62330E+01
.41487E-03	.28302E+00	.61766E-02	.55341E-15	.25401E-01	.62429E+01	.62429E+01

.47407E-03	.32011E+00	.76806E-02	-.64233E-15	.25413E-01	-.62298E+01	-.75424E+01
.53916E-03	.36031E+00	.93962E-02	-.74793E-15	.25394E-01	.61740E+01	.78539E+01
.61516E-03	.40646E+00	.11507E-01	-.08501E-15	.25394E-01	.61047E+01	.82211E+01
.69072E-03	.45639E+00	.13949E-01	-.10589E-14	.25397E-01	-.59724E+01	.86499E+01
.79110E-03	.51054E+00	.16734E-01	-.12896E-14	.25337E-01	.57790E+01	.91189E+01
.89272E-03	.56907E+00	.19944E-01	-.15394E-14	.25278E-01	.55118E+01	.96621E+01
.10036E-02	.63164E+00	.23504E-01	-.20733E-14	.25228E-01	.51987E+01	.10272E+02
.11253E-02	.69844E+00	.27775E-01	-.27363E-14	.25140E-01	.47013E+01	.10956E+02
.12533E-02	.76910E+00	.32634E-01	-.40190E-14	.25045E-01	.41228E+01	.11709E+02
.14057E-02	.84183E+00	.38399E-01	-.63143E-14	.24903E-01	.34478E+01	.12503E+02
.15688E-02	.91113E+00	.44971E-01	-.11210E-13	.24711E-01	.26031E+01	.13255E+02
.17371E-02	.96242E+00	.51374E-01	-.22401E-13	.24425E-01	.18591E+01	.13749E+02
.19055E-02	.98498E+00	.54963E-01	-.47129E-13	.23989E-01	.14132E+01	.13870E+02
.20739E-02	.98734E+00	.55869E-01	-.96598E-13	.23519E-01	.12877E+01	.13907E+02
.22423E-02	.98634E+00	.55830E-01	-.17284E-12	.23022E-01	.12822E+01	.13785E+02
.24103E-02	.98751E+00	.55940E-01	-.25339E-12	.22579E-01	.12787E+01	.13801E+02
.25782E-02	.98801E+00	.56714E-01	-.35708E-12	.22113E-01	.12607E+01	.13797E+02
.27462E-02	.98844E+00	.57521E-01	-.50714E-12	.21667E-01	.12482E+01	.13796E+02
.29141E-02	.98695E+00	.58793E-01	-.56978E-12	.21234E-01	.12344E+01	.13797E+02
.30821E-02	.98932E+00	.60218E-01	-.60714E-12	.20796E-01	.12219E+01	.13796E+02
.32501E-02	.98970E+00	.61979E-01	-.81307E-12	.20385E-01	.12108E+01	.13797E+02
.34138E-02	.99000E+00	.63873E-01	-.94721E-12	.19961E-01	.11989E+01	.13796E+02
.35608E-02	.99025E+00	.65764E-01	-.10770E-11	.19614E-01	.11895E+01	.13796E+02
.36910E-02	.99045E+00	.67522E-01	-.12019E-11	.19279E-01	.11813E+01	.13796E+02
.38085E-02	.99063E+00	.69159E-01	-.13223E-11	.18998E-01	.11740E+01	.13796E+02
.39135E-02	.99079E+00	.70608E-01	-.14376E-11	.18724E-01	.11674E+01	.13797E+02
.40101E-02	.99094E+00	.71899E-01	-.15497E-11	.18489E-01	.11611E+01	.13796E+02
.40983E-02	.99110E+00	.72982E-01	-.16578E-11	.18298E-01	.11552E+01	.13797E+02
.41740E-02	.99126E+00	.73860E-01	-.17592E-11	.18076E-01	.11497E+01	.13797E+02
.42494E-02	.99142E+00	.74472E-01	-.18523E-11	.17891E-01	.11445E+01	.13797E+02
.43141E-02	.99157E+00	.74919E-01	-.19383E-11	.17761E-01	.11400E+01	.13797E+02
.43729E-02	.99173E+00	.75022E-01	-.20103E-11	.17620E-01	.11357E+01	.13797E+02
.44275E-02	.99182E+00	.75226E-01	-.20729E-11	.17502E-01	.11330E+01	.13797E+02
.44779E-02	.99193E+00	.75750E-01	-.21221E-11	.16099E-01	.11111E+01	.13800E+02
ITER, INS	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
ITER, INS	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
ITER, INS	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
ITER, INS	1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0					
ITER, INS	1 0 0 1 1 1 1 1 1 1 1 1 1 1 0 0 0					
ITER, INS	1 0 0 0 0 1 1 1 1 1 1 1 1 1 0 0 0 0					
ITER, INS	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					

SOLUTION AT X = .41000E-01

AT FI =	6.00	CFINF =	.23267E-01	SFINF =	.10214E+00	SHOCK DISTANCE =	.10304E-02
Y	U	V	A	P	H	H TOTAL	
.0.	.0.	.0.	.0.	.14400E+00	.55093E+01	.55093E+01	
.68656E-05	.17208E-01	.86531E-05	.54635E-68	.14398E+00	.56266E+01	.56266E+01	
.14118E-04	.35824E-01	.37749E-04	.11393E-67	.14397E+00	.57380E+01	.57380E+01	
.22657E-04	.55795E-01	.92153E-04	.17612E-67	.14395E+00	.58560E+01	.58595E+01	
.31754E-04	.77443E-01	.17950E-03	.24294E-67	.14393E+00	.59746E+01	.60515E+01	
.41002E-04	.10123E+00	.30918E-03	.31414E-67	.14391E+00	.60941E+01	.62232E+01	
.53037E-04	.12694E+00	.49085E-03	.38820E-67	.14388E+00	.62112E+01	.64174E+01	
.65222E-04	.15456E+00	.73339E-03	.46329E-67	.14386E+00	.63228E+01	.65286E+01	
.71510E-04	.18955E+00	.86509E-03	.50173E-67	.14384E+00	.63773E+01	.67453E+01	
.78613E-04	.18442E+00	.10515E-02	.53017E-67	.14383E+00	.64270E+01	.68624E+01	
.85992E-04	.20057E+00	.12489E-02	.57559E-67	.14381E+00	.64765E+01	.69919E+01	
.93374E-04	.21600E+00	.14615E-02	.61039E-67	.14380E+00	.65205E+01	.71222E+01	
.10068E-03	.23198E+00	.19823E-02	.67722E-67	.14376E+00	.65908E+01	.74116E+01	
.12770E-03	.25020E+00	.26347E-02	.73412E-67	.14373E+00	.66565E+01	.77346E+01	
.14761E-03	.31170E+00	.34389E-02	.77549E-67	.14368E+00	.68088E+01	.80991E+01	
.16958E-03	.37666E+00	.44183E-02	.79430E-67	.14365E+00	.68807E+01	.84971E+01	
.19378E-03	.43519E+00	.55857E-02	.78283E-67	.14361E+00	.66289E+01	.89433E+01	
.22039E-03	.47733E+00	.69579E-02	.73289E-67	.14357E+00	.69197E+01	.94367E+01	
.25146E-03	.51650E+00	.86289E-02	.62923E-67	.14352E+00	.63271E+01	.10812E+02	
.28461E-03	.59917E+00	.10504E-01	.46910E-67	.14349E+00	.60412E+01	.10638E+02	
.10304E-02	.92447E+00	.90525E-01	.0.	.11963E+00	.27439E+01	.13800E+02	

AT FI =	120.00	CFINF =	.02660E-02	SFINF =	.31112E-01	SHOCK DISTANCE =	.37895E-02
Y	U	V	A	P	H	M TOTAL	
J.	0.	0.	0.	0.	.37999E-01	.55093E+01	.55093E+01
.14214E-04	.12658E-01	.10415E-04	.48939E-02	.36007E-01	.55812E+01	.55831E+01	
.29849E-04	.20415E-01	.45713E-04	.10053E-01	.36016E-01	.56544E+01	.56647E+01	
.46906E-04	.31239E-01	.10965E-03	.15425E-01	.36024E-01	.57292E+01	.57540E+01	
.65739E-04	.57404E-01	.21102E-03	.21058E-01	.36036E-01	.58055E+01	.58533E+01	

AT FI	130.00	CFINF	STINF	SHOCK DISTANCE	M	M TOTAL
.06708E-04	.75172E-01	.39727E-03	.26975E-01	.36043E-01	.58829E+01	.59645E+01
.10980E-03	.94487E-01	.55802E-03	.33081E-01	.36060E-01	.59596E+01	.60875E+01
.13503E-03	.11531E+00	.81942E-03	.39279E-01	.36067E-01	.60338E+01	.62236E+01
.14889E-03	.12684E+00	.98028E-03	.42486E-01	.36076E-01	.60706E+01	.62990E+01
.16275E-03	.13790E+00	.11527E-02	.45555E-01	.36081E-01	.61046E+01	.63746E+01
.17603E-03	.15023E+00	.13552E-02	.48781E-01	.36091E-01	.61390E+01	.64503E+01
.19331E-03	.16248E+00	.15708E-02	.51930E-01	.36097E-01	.61702E+01	.65425E+01
.22707E-03	.18927E+00	.20862E-02	.58001E-01	.36120E-01	.62283E+01	.67301E+01
.26430E-03	.21851E+00	.27152E-02	.64130E-01	.36132E-01	.62763E+01	.69402E+01
.30560E-03	.25040E+00	.34654E-02	.69879E-01	.36160E-01	.63104E+01	.71756E+01
.35109E-03	.28516E+00	.43534E-02	.75117E-01	.36175E-01	.63264E+01	.74397E+01
.40119E-03	.32299E+00	.53779E-02	.79656E-01	.36207E-01	.63190E+01	.77359E+01
.45627E-03	.36407E+00	.65932E-02	.83263E-01	.36223E-01	.62822E+01	.80681E+01
.52859E-03	.41146E+00	.79471E-02	.85788E-01	.36250E-01	.62026E+01	.84646E+01
.59130E-03	.46289E+00	.95012E-02	.86571E-01	.36273E-01	.60713E+01	.89112E+01
.37892E-02	.96879E+00	.38187E-01	.16512E+00	.33153E-01	.14157E+01	.13800E+02

AT FI = 130.00 CFINF = .76560E-02 STINF = .28245E-01 SHOCK DISTANCE = .40315E-02

Y Y M P M M TOTAL

AT FI	130.00	CFINF	STINF	SHOCK DISTANCE	M	M TOTAL
.15121E-04	.12471E-01	.11330E-04	.42627E-02	.32260E-01	.55093E+01	.55093E+01
.31755E-04	.26028E-01	.49807E-04	.87508E-02	.32268E-01	.55703E+01	.55805E+01
.59901E-04	.40039E-01	.12009E-03	.13442E-01	.32277E-01	.56496E+01	.56592E+01
.69937E-04	.56573E-01	.23171E-03	.18354E-01	.32285E-01	.57220E+01	.57453E+01
.92245E-04	.74090E-01	.39362E-03	.23510E-01	.32290E-01	.57960E+01	.58412E+01
.11681E-03	.93134E-01	.61689E-03	.28848E-01	.32305E-01	.58712E+01	.59405E+01
.14365E-03	.11167E+00	.96937E-03	.34262E-01	.32322E-01	.59458E+01	.60675E+01
.15440E-03	.12464E+00	.10903E-02	.37863E-01	.32330E-01	.60182E+01	.61906E+01
.17315E-03	.13919E+00	.12847E-02	.39746E-01	.32339E-01	.60541E+01	.62712E+01
.18940E-03	.14809E+00	.15137E-02	.42566E-01	.32344E-01	.60873E+01	.63441E+01
.20566E-03	.16010E+00	.17581E-02	.45250E-01	.32354E-01	.61209E+01	.64248E+01
.22197E-03	.16810E+00	.20465E-02	.50701E-01	.32359E-01	.61515E+01	.65061E+01
.28126E-03	.21543E+00	.38702E-02	.65005E-01	.32384E-01	.62032E+01	.65872E+01
.32512E-03	.24688E+00	.39402E-02	.61033E-01	.32394E-01	.62557E+01	.66900E+01
.37391E-03	.28118E+00	.49612E-02	.65834E-01	.32422E-01	.62695E+01	.71175E+01
.42641E-03	.31446E+00	.61951E-02	.69627E-01	.32433E-01	.63037E+01	.73730E+01
.48541E-03	.35499E+00	.76053E-02	.72811E-01	.32464E-01	.62992E+01	.76599E+01
.55383E-03	.40974E+00	.93027E-02	.75860E-01	.32474E-01	.62639E+01	.79821E+01
.62906E-03	.45651E+00	.11226E-01	.75882E-01	.32505E-01	.61871E+01	.83579E+01
				.32511E-01	.68599E+01	.88027E+01

.40315E-02 .97452E+00 .49161E-01 .14895E+00 .27963E-01 .13292E+01 .13..4E+02

AT FI = 140.00 CFINF = .72078E-02 STINF = .26122E-01 SHOCK DISTANCE = .42467E-02

H TOTAL

Y	U	V	M	P	H	H TOTAL
.0.	.0.	.0.	.0.	.29425E-01	.55893E+01	.55893E+01
.15929E-04	.12367E-01	.11888E-04	.35345E-02	.29436E-01	.55766E+01	.55766E+01
.33450E-04	.29814E-01	.52671E-04	.72638E-02	.29443E-01	.56460E+01	.56460E+01
.52565E-04	.48307E-01	.12695E-03	.11140E-01	.29451E-01	.57168E+01	.57168E+01
.73670E-04	.56115E-01	.24578E-03	.15225E-01	.29464E-01	.57891E+01	.57891E+01
.97169E-04	.73445E-01	.41870E-03	.19310E-01	.29471E-01	.58627E+01	.58627E+01
.12305E-03	.92386E-01	.65788E-03	.23935E-01	.29489E-01	.59359E+01	.59359E+01
.15132E-03	.11276E+00	.97245E-03	.28430E-01	.29495E-01	.60069E+01	.60069E+01
.16685E-03	.12384E+00	.11870E-02	.33757E-01	.29504E-01	.60748E+01	.60748E+01
.18239E-03	.13486E+00	.13783E-02	.32984E-01	.29509E-01	.61479E+01	.61479E+01
.19951E-03	.14691E+00	.16269E-02	.35327E-01	.29519E-01	.62155E+01	.62155E+01
.21683E-03	.15890E+00	.18292E-02	.37556E-01	.29525E-01	.62830E+01	.62830E+01
.25446E-03	.18511E+00	.25361E-02	.42085E-01	.29549E-01	.63401E+01	.63401E+01
.29628E-03	.21378E+00	.33341E-02	.46491E-01	.29557E-01	.64001E+01	.64001E+01
.34247E-03	.24490E+00	.42982E-02	.52571E-01	.29585E-01	.64530E+01	.64530E+01
.39345E-03	.27889E+00	.54538E-02	.54495E-01	.29592E-01	.65040E+01	.65040E+01
.44959E-03	.31500E+00	.68165E-02	.57817E-01	.29621E-01	.65540E+01	.65540E+01
.51132E-03	.35607E+00	.84138E-02	.63488E-01	.29626E-01	.66040E+01	.66040E+01
.58339E-03	.40243E+00	.10353E-01	.62345E-01	.29652E-01	.66540E+01	.66540E+01
.66264E-03	.45278E+00	.12578E-01	.63138E-01	.29650E-01	.67040E+01	.67040E+01
.42407E-02	.98813E+00	.57578E-01	.12882E+00	.29735E-01	.12568E+01	.12568E+01

AT FI = 150.00 CFINF = .68942E-02 STINF = .24618E-01 SHOCK DISTANCE = .44239E-02

H TOTAL

Y	U	V	M	P	H	H TOTAL
.0.	.0.	.0.	.0.	.27352E-01	.55893E+01	.55893E+01
.16593E-04	.12323E-01	.12131E-04	.27249E-02	.27360E-01	.55753E+01	.55753E+01
.34047E-04	.25722E-01	.54282E-04	.56001E-02	.27370E-01	.56436E+01	.56436E+01
.54759E-04	.48165E-01	.13189E-03	.85998E-02	.27377E-01	.57132E+01	.57132E+01
.76745E-04	.55919E-01	.25432E-03	.11740E-01	.27391E-01	.57844E+01	.57844E+01

.10122E-03	.73237E-01	.43303E-03	.15045E-01	.27397E-01	.56570E+01	.59285E+01
.12019E-03	.92066E-01	.60367E-03	.10458E-01	.27416E-01	.59292E+01	.60420E+01
.15764E-03	.11237E+00	.10130E-02	.21925E-01	.27420E-01	.59993E+01	.61671E+01
.17302E-03	.12341E+00	.12180E-02	.23720E-01	.27430E-01	.60341E+01	.62363E+01
.19000E-03	.13439E+00	.14394E-02	.25430E-01	.27434E-01	.60664E+01	.63858E+01
.20783E-03	.14648E+00	.17012E-02	.27245E-01	.27444E-01	.60998E+01	.63829E+01
.22568E-03	.15834E+00	.19821E-02	.28655E-01	.27449E-01	.61288E+01	.64605E+01
.26500E-03	.18445E+00	.26627E-02	.32450E-01	.27474E-01	.61843E+01	.66333E+01
.30864E-03	.21294E+00	.35090E-02	.35837E-01	.27480E-01	.62302E+01	.68272E+01
.35677E-03	.24401E+00	.45374E-02	.39080E-01	.27507E-01	.62630E+01	.70449E+01
.40907E-03	.27707E+00	.57837E-02	.42029E-01	.27511E-01	.62784E+01	.72098E+01
.46035E-03	.31470E+00	.72531E-02	.44589E-01	.27530E-01	.62715E+01	.75653E+01
.53266E-03	.35471E+00	.89912E-02	.46632E-01	.27539E-01	.62363E+01	.78756E+01
.60774E-03	.40065E+00	.11113E-01	.48076E-01	.27562E-01	.61600E+01	.82479E+01
.69029E-03	.45099E+00	.13564E-01	.48607E-01	.27552E-01	.60342E+01	.86698E+01
.44239E-02	.98528E+00	.63152E-01	.93665E-01	.20417E-01	.11960E+01	.13800E+02

AT FI = 166.00 CFINF = .66099E-02 STINF = .23627E-01 SHOCK DISTANCE = .45553E-02

Y U V P M H TOTAL

.17006E-04	.12313E-01	.0.	.12367E-04	.0.	.25936E-01	.55093E+01
.35082E-04	.25702E-01	.55230E-04	.18375E-02	.25944E-01	.55745E+01	.55765E+01
.56385E-04	.40134E-01	.13353E-03	.58445E-02	.25953E-01	.56421E+01	.56507E+01
.79025E-04	.55875E-01	.25942E-03	.79821E-02	.25961E-01	.57110E+01	.57320E+01
.10423E-03	.73181E+01	.44320E-03	.11230E-01	.25974E-01	.57815E+01	.58222E+01
.13199E-03	.9194E-01	.69941E-03	.12550E-01	.25999E-01	.58334E+01	.59233E+01
.16232E-03	.11220E+00	.10384E-02	.14900E-01	.26004E-01	.59250E+01	.60353E+01
.17098E-03	.12331E+00	.12492E-02	.15120E-01	.26013E-01	.59945E+01	.61580E+01
.19565E-03	.13420E+00	.14778E-02	.17296E-01	.26017E-01	.60291E+01	.62271E+01
.21401E-03	.14620E+00	.17483E-02	.18524E-01	.26027E-01	.60611E+01	.62957E+01
.23238E-03	.15821E+00	.20380E-02	.19895E-01	.26032E-01	.60935E+01	.63718E+01
.27296E-03	.18429E+00	.27400E-02	.2366E-01	.26057E-01	.61290E+01	.64484E+01
.31781E-03	.21275E+00	.36232E-02	.24376E-01	.26066E-01	.61781E+01	.66191E+01
.36736E-03	.24370E+00	.46998E-02	.25653E-01	.26066E-01	.62235E+01	.68187E+01
.42204E-03	.27758E+00	.59946E-02	.28557E-01	.26089E-01	.62959E+01	.70258E+01
.48227E-03	.31434E+00	.75445E-02	.30303E-01	.26089E-01	.62788E+01	.72600E+01
.54868E-03	.33427E+00	.93794E-02	.31887E-01	.26115E-01	.62633E+01	.75406E+01
.62580E-03	.40031E+00	.11622E-01	.32663E-01	.26111E-01	.62274E+01	.78479E+01
				.26132E-01	.61504E+01	.82169E+01

AT PI = 170.00 CIMP = .69799E+02 STMP = .23088E-01 SHOCK DISTANCE = .43351E-02

Y	U	V	W	P	M	H TOTAL
.17308E-04	.12319E-01	0.	.93112E-03	.25111E-01	.55093E+01	.55093E+01
.16510E-04	.25746E-01	.12336E-04	.9139E-02	.27110E-01	.55761E+01	.55761E+01
.57372E-04	.46141E-01	.55568E-04	.9139E-02	.25120E-01	.56497E+01	.56497E+01
.80408E-04	.59809E-01	.13436E-03	.23183E-02	.25135E-01	.57305E+01	.57305E+01
.10606E-03	.73194E-01	.26145E-03	.47137E-02	.25145E-01	.57798E+01	.57798E+01
.13430E-03	.92010E-01	.44702E-03	.51447E-02	.25154E-01	.58203E+01	.58203E+01
.16510E-03	.11230E+00	.70620E-03	.61130E-02	.25173E-01	.59227E+01	.59227E+01
.18211E-03	.12333E+00	.10493E-02	.75005E-02	.25177E-01	.59920E+01	.59920E+01
.19907E-03	.13430E+00	.12633E-02	.81153E-02	.25185E-01	.60264E+01	.60264E+01
.21778E-03	.14630E+00	.14949E-02	.87040E-02	.25190E-01	.60582E+01	.60582E+01
.23645E-03	.15823E+00	.17695E-02	.93233E-02	.25203E-01	.60903E+01	.60903E+01
.27274E-03	.18431E+00	.20649E-02	.99127E-02	.25204E-01	.61199E+01	.61199E+01
.32337E-03	.21275E+00	.27820E-02	.11110E-01	.25230E-01	.61747E+01	.61747E+01
.37379E-03	.24375E+00	.36799E-02	.12276E-01	.25232E-01	.62190E+01	.62190E+01
.42943E-03	.27757E+00	.47747E-02	.13382E-01	.25259E-01	.62519E+01	.62519E+01
.49071E-03	.31431E+00	.61102E-02	.14394E-01	.25259E-01	.62665E+01	.62665E+01
.55809E-03	.35420E+00	.76594E-02	.15274E-01	.25284E-01	.62989E+01	.62989E+01
.63679E-03	.40019E+00	.95765E-02	.15975E-01	.25270E-01	.62221E+01	.62221E+01
.72324E-03	.45911E+00	.11897E-01	.16471E-01	.25296E-01	.61444E+01	.61444E+01
.81806E-03	.50454E+00	.14598E-01	.16653E-01	.25277E-01	.60171E+01	.60171E+01
.92405E-03	.56355E+00	.17673E-01	.16459E-01	.25274E-01	.58277E+01	.58277E+01
.10388E-02	.62601E+00	.21188E-01	.15831E-01	.25230E-01	.55026E+01	.55026E+01
.11640E-02	.69467E+00	.25077E-01	.14732E-01	.25107E-01	.52806E+01	.52806E+01
.13035E-02	.76664E+00	.29490E-01	.13142E-01	.25104E-01	.47470E+01	.47470E+01
.14561E-02	.84070E+00	.34451E-01	.11083E-01	.24992E-01	.41591E+01	.41591E+01
.16239E-02	.91137E+00	.40190E-01	.90704E-02	.24027E-01	.34302E+01	.34302E+01
.17981E-02	.96327E+00	.46631E-01	.62375E-02	.24592E-01	.28052E+01	.28052E+01
.19724E-02	.98523E+00	.52042E-01	.44360E-02	.24263E-01	.19466E+01	.19466E+01
.21467E-02	.98704E+00	.56138E-01	.30819E-02	.23777E-01	.14043E+01	.14043E+01
.23210E-02	.98407E+00	.56847E-01	.19819E-02	.23294E-01	.12984E+01	.12984E+01
.24949E-02	.98407E+00	.56759E-01	.51920E-02	.22773E-01	.12075E+01	.12075E+01
.26687E-02	.98768E+00	.56910E-01	.69011E-02	.22324E-01	.12823E+01	.12823E+01
		.57772E-01	.11250E-01	.21656E-01	.12650E+01	.12650E+01

Y	U	V	A	P	H	H TOTAL
.28426E-02	.98809E+00	.58650E-01	.13634E-01	.21414E-01	.12524E+01	.13796E+02
.30164E-02	.98852E+00	.60039E-01	.15352E-01	.20380E-01	.12392E+01	.13797E+02
.31903E-02	.98889E+00	.61588E-01	.16349E-01	.20599E-01	.12270E+01	.13796E+02
.33642E-02	.98917E+00	.63444E-01	.20742E-01	.20146E-01	.12152E+01	.13796E+02
.35335E-02	.98941E+00	.65421E-01	.23167E-01	.19740E-01	.12043E+01	.13796E+02
.36858E-02	.98960E+00	.67375E-01	.23210E-01	.19413E-01	.11930E+01	.13796E+02
.38205E-02	.98975E+00	.69120E-01	.23088E-01	.19110E-01	.11866E+01	.13796E+02
.39422E-02	.98989E+00	.70704E-01	.22759E-01	.18870E-01	.11791E+01	.13796E+02
.40508E-02	.99003E+00	.72008E-01	.31244E-01	.18648E-01	.11720E+01	.13796E+02
.41508E-02	.99018E+00	.73081E-01	.31560E-01	.18478E-01	.11654E+01	.13796E+02
.42421E-02	.99034E+00	.73863E-01	.32599E-01	.18320E-01	.11591E+01	.13797E+02
.43246E-02	.99050E+00	.74390E-01	.33517E-01	.18212E-01	.11535E+01	.13797E+02
.43985E-02	.99066E+00	.74622E-01	.34303E-01	.18110E-01	.11486E+01	.13797E+02
.44655E-02	.99078E+00	.74717E-01	.34758E-01	.18054E-01	.11449E+01	.13797E+02
.45264E-02	.99093E+00	.74879E-01	.35004E-01	.17967E-01	.11417E+01	.13797E+02
.45829E-02	.99094E+00	.74640E-01	.35064E-01	.18012E-01	.11407E+01	.13797E+02
.46351E-02	.99239E+00	.67251E-01	.35170E-01	.16515E-01	.11204E+01	.13800E+02

A7 F1 = 180.00 CPMF = .63380E-02 STIFF = .2283E-01 SHOCK DISTANCE = .46618E-02

Y	U	V	A	P	H	H TOTAL
.17481E-04	0.	0.	0.	.2449E-01	.55893E+01	.55893E+01
.36721E-04	.12315E-01	.12488E-04	.23917E-16	.24898E-01	.55748E+01	.55748E+01
.57703E-04	.25745E-01	.56114E-04	.49991E-16	.24866E-01	.56409E+01	.56409E+01
.80872E-04	.40140E-01	.13569E-03	.7182E-16	.24873E-01	.57299E+01	.57299E+01
.10667E-03	.55884E+01	.26395E-03	.11504E-19	.24888E-01	.57793E+01	.57793E+01
.13508E-03	.73194E-01	.45137E-03	.11318E-15	.24892E-01	.58500E+01	.58500E+01
.15611E-03	.92007E-01	.71290E-03	.11043E-15	.24911E-01	.59219E+01	.59219E+01
.18317E-03	.11229E+00	.10598E-02	.22398E-19	.24915E-01	.59911E+01	.59911E+01
.20822E-03	.12333E+00	.12755E-02	.24323E-15	.24924E-01	.60254E+01	.60254E+01
.21901E-03	.13429E+00	.15094E-02	.25548E-15	.24928E-01	.60573E+01	.60573E+01
.23781E-03	.14629E+00	.17887E-02	.29035E-15	.24938E-01	.60895E+01	.60895E+01
.27934E-03	.15822E+00	.20846E-02	.31465E-15	.24942E-01	.61182E+01	.61182E+01
.32524E-03	.18430E+00	.28991E-02	.36936E-15	.24967E-01	.61735E+01	.61735E+01
.37595E-03	.21279E+00	.37149E-02	.43821E-15	.24989E-01	.62186E+01	.62186E+01
.43191E-03	.24376E+00	.48222E-02	.59049E-15	.24995E-01	.62506E+01	.62506E+01
.49354E-03	.27759E+00	.61695E-02	.58048E-15	.24995E-01	.62651E+01	.62651E+01
.56130E-03	.31428E+00	.77708E-02	.67372E-15	.25019E-01	.62970E+01	.62970E+01
	.35416E+00	.96735E-02	.78454E-15	.25013E-01	.62264E+01	.62264E+01

.64042E+03	.42014E+00	.12016E-01	-.92350E-15	.25030E-01	.61425E+01	.81979E+01
.72741E+03	.45803E+00	.14747E-01	-.11113E-14	.25009E-01	.68150E+01	.65162E+01
.46618E+02	.99341E+00	.67439E-01	-.71349E-15	.16804E-01	.21100E+01	.12110E+02

ITER, INS
ITER, INS
ITER, INS
ITER, INS
ITER, INS
ITER, INS

SOLUTION AT X = .5800E-01

AT FI = C.00 CFINF = .2336E-01 STINF = .10234E+00 SHOCK DISTANCE = .20025E-02

Y U V W P M H TOTAL

0.	0.	0.	0.	0.	0.	0.	0.
.78111E-05	.19635E-01	-.45202E-05	.15706E-68	.17503E+00	.55093E+01	.55893E+01	
.16404E-04	.40020E-01	-.19564E-04	.39574E-68	.17503E+00	.56305E+01	.56434E+01	
.25777E-04	.63517E-01	-.47697E-04	.47709E-68	.17503E+00	.57598E+01	.57909E+01	
.36127E-04	.86108E-01	-.92515E-04	.65718E-68	.17503E+00	.60312E+01	.61306E+01	
.47650E-04	.11494E+00	-.15062E-03	.83309E-68	.17503E+00	.61608E+01	.63500E+01	
.60301E-04	.14604E+00	-.25007E-03	.10592E-67	.17499E+00	.62254E+01	.65510E+01	
.74305E-04	.17521E+00	-.37064E-03	.12786E-67	.17490E+00	.63011E+01	.67940E+01	
.81833E-04	.19211E+00	-.46532E-03	.13797E-67	.17497E+00	.63500E+01	.69285E+01	
.89440E-04	.20867E+00	-.52606E-03	.14834E-67	.17497E+00	.64251E+01	.70635E+01	
.97835E-04	.22716E+00	-.62013E-03	.15910E-67	.17496E+00	.65526E+01	.72131E+01	
.10633E-03	.24631E+00	-.72081E-03	.16912E-67	.17496E+00	.65932E+01	.73639E+01	
.12478E-03	.26484E+00	-.86112E-03	.18847E-67	.17493E+00	.65596E+01	.76981E+01	
.14529E-03	.32723E+00	-.12508E-02	.23504E-67	.17494E+00	.66373E+01	.80729E+01	
.16796E-03	.37416E+00	-.15311E-02	.23725E-67	.17493E+00	.66975E+01	.84039E+01	
.19294E-03	.42400E+00	-.19785E-02	.23357E-67	.17492E+00	.66495E+01	.89543E+01	
.22077E-03	.47615E+00	-.24325E-02	.22255E-67	.17492E+00	.65826E+01	.94691E+01	
.25074E-03	.53599E+00	-.28625E-02	.21419E-67	.17491E+00	.63527E+01	.10035E+02	
.28609E-03	.60033E+00	-.32877E-02	.19832E-67	.17491E+00	.60777E+01	.10686E+02	
.32495E-03	.66701E+00	-.36494E-02	.17360E-67	.17490E+00	.56840E+01	.11370E+02	
.20825E-02	.91295E+00	-.59508E-01	J.	.14240E+00	.36861E+01	.13800E+02	

AT FI = 120.80 CFINF = .68427E-02 STINF = .24401E-01 SHOCK DISTANCE = .48487E-02

Y U V W P M H TOTAL

1.	0.	0.	0.	0.	0.	0.	0.
.18427E-04	.13445E-01	.19463E-04	.70734E-02	.31801E-01	.52093E+01	.55093E+01	
.38193E-04	.27940E-01	.82939E-04	.15170E-01	.31812E-01	.55016E+01	.55041E+01	
.60017E-04	.43504E-01	.19890E-03	.24805E-01	.31824E-01	.56538E+01	.56671E+01	
.84115E-04	.68557E-01	.37980E-03	.33852E-01	.31837E-01	.57263E+01	.57589E+01	
				.31850E-01	.57980E+01	.58604E+01	

.11094E-03	.79185E-01	.64080E-03	.43155E-01	.31866E-01	.58787E+01	.59751E+01
.14049E-03	.99382E-01	.99473E-03	.53155E-01	.31883E-01	.5948	.61827E+01
.17277E-03	.12110E+00	.14521E-02	.43101E-01	.31922E-01	.68891E+01	.62438E+01
.13651E-03	.13289E+00	.17315E-02	.68145E-01	.31912E-01	.68363E+01	.63222E+01
.20825E-03	.14459E+00	.20293E-02	.73165E-01	.31923E-01	.68486E+01	.64888E+01
.22779E-03	.15738E+00	.23774E-02	.78335E-01	.31935E-01	.68729E+01	.68882E+01
.24735E-03	.17008E+00	.27448E-02	.83252E-01	.31947E-01	.61170E+01	.60761E+01
.29054E-03	.19780E+00	.36182E-02	.93224E-01	.31955E-01	.61599E+01	.67721E+01
.33828E-03	.22797E+00	.46635E-02	.10490E+00	.32085E-01	.61980E+01	.69917E+01
.39102E-03	.26879E+00	.56942E-02	.11283E+00	.32042E-01	.62862E+01	.72888E+01
.44922E-03	.29649E+00	.73155E-02	.12433E+00	.32081E-01	.62827E+01	.79139E+01
.51835E-03	.33529E+00	.89286E-02	.12748E+00	.32129E-01	.63779E+01	.78223E+01
.58381E-03	.37727E+00	.10714E-01	.13800E+00	.32176E-01	.61184	.81683E+01
.66610E-03	.42566E+00	.12779E-01	.13471E+00	.32237E-01	.6811	.84795E+01
.75658E-03	.47811E+00	.14966E-01	.13735E+00	.32291E-01	.98894	.98418E+01
.8487E-02	.96856E+00	.42028E-01	.16861E+00	.34556E-01	.14388E+01	.11888E+02

A? FI = 130.00 CFINF = .61297E-02 STANF = .20499E-01 SMOCK DISTANCE = .52528E-02

Y U V W H TOTAL

.19782E-04	.0.	.19771E-04	.0.	.27427E-01	.55893E+01	.55893E+01
.41375E-04	.27111E-01	.84675E-04	.68123E-02	.27449E-01	.55762E+01	.55762E+01
.65018E-04	.42261E-01	.20371E-03	.21499E-01	.27461E-01	.56422E+01	.56422E+01
.91124E-04	.58730E-01	.39031E-03	.23371E-01	.27474E-01	.57887E+01	.57887E+01
.12049E-03	.76771E-01	.66882E-03	.37459E-01	.27488E-01	.58488E+01	.58488E+01
.15280E-03	.96312E-01	.10297E-02	.46220E-01	.27504E-01	.59144E+01	.59144E+01
.18717E-03	.11730E+00	.15094E-02	.54336E-01	.27521E-01	.59773E+01	.59773E+01
.20638E-03	.15669E+00	.18839E-02	.59458E-01	.27538E-01	.60075E+01	.60075E+01
.22560E-03	.19990E+00	.21189E-02	.63777E-01	.27559E-01	.60349E+01	.60349E+01
.24637E-03	.15232E+00	.24886E-02	.68331E-01	.27559E-01	.60621E+01	.60621E+01
.26798E-03	.16456E+00	.28883E-02	.72859E-01	.27568E-01	.60883E+01	.60883E+01
.31475E-03	.19123E+00	.38177E-02	.81434E-01	.27585E-01	.61292E+01	.61292E+01
.36647E-03	.22826E+00	.49510E-02	.93197E-01	.27610E-01	.61614E+01	.61614E+01
.42361E-03	.25179E+00	.63065E-02	.93271E-01	.27628E-01	.61799E+01	.61799E+01
.48666E-03	.28664E+00	.78817E-02	.10578E+00	.27671E-01	.61809E+01	.61809E+01
.55618E-03	.32319E+00	.97025E-02	.11226E+00	.27711E-01	.61604E+01	.61604E+01
.63246E-03	.36346E+00	.11766E-01	.11744E+00	.27744E-01	.61432E+01	.61432E+01
.72161E-03	.46985E+00	.14205E-01	.12188E+00	.27792E-01	.60271E+01	.60271E+01

.88013E+01
.13800E+02

.58953E+01
.13460E+01

.27828E-01
.28956E-01

.12235E+00
.14467E+00

.15879E-01
.52354E-01

.46013E+00
.97429E+00

.81963E-03
.52520E-02

.56172E-02

SHOCK DISTANCE =

.18592E-01

STINF =

.55134E-02

CFINF =

140.00

AT FI =

M TOTAL

M

P

M

Y

U

Y

.55093E+01
.55751E+01
.56480E+01
.57282E+01
.58176E+01
.59180E+01
.60297E+01
.61531E+01
.62216E+01
.62904E+01
.63667E+01
.64436E+01
.65149E+01
.66070E+01
.67222E+01
.68466E+01
.69736E+01
.71141E+01
.72699E+01
.74294E+01
.76149E+01
.78416E+01
.80699E+01
.83294E+01
.86294E+01
.89800E+02

.55833E+01
.55726E+01
.56373E+01
.57033E+01
.57678E+01
.58334E+01
.58974E+01
.59583E+01
.59898E+01
.60150E+01
.60421E+01
.60662E+01
.61099E+01
.61436E+01
.61847E+01
.62521E+01
.63167E+01
.63844E+01
.64544E+01
.65141E+01
.65630E+01
.66170E+01
.66755E+01
.67385E+01

.24334E-01
.24344E-01
.24354E-01
.24365E-01
.24377E-01
.24390E-01
.24404E-01
.24418E-01
.24427E-01
.24435E-01
.24444E-01
.24453E-01
.24475E-01
.24493E-01
.24521E-01
.24541E-01
.24573E-01
.24594E-01
.24630E-01
.24650E-01
.24650E-01
.24385E-01

.56067E-02
.11333E-01
.17719E-01
.24226E-01
.31085E-01
.38189E-01
.45812E-01
.49192E-01
.52798E-01
.56599E-01
.60225E-01
.67318E-01
.74851E-01
.81754E-01
.88116E-01
.94630E-01
.98194E-01
.10146E+00
.10278E+00
.11338E+00

.19339E-04
.83236E-04
.20380E-03
.36593E-03
.65538E-03
.10243E-02
.15075E-02
.18053E-02
.21240E-02
.25010E-02
.29011E-02
.38636E-02
.50377E-02
.64492E-02
.81228E-02
.10074E-01
.12323E-01
.15028E-01
.18071E-01
.60733E-01

.12740E-01
.28546E-01
.41374E-01
.57485E-01
.75122E-01
.94213E-01
.11470E+00
.12901E+00
.13602E+00
.14885E+00
.16077E+00
.18674E+00
.21493E+00
.24542E+00
.27876E+00
.31477E+00
.35379E+00
.39873E+00
.44756E+00
.49788E+00

.21469E-04
.44246E-04
.69529E-04
.97446E-04
.12853E-03
.16276E-03
.20016E-03
.22070E-03
.24125E-03
.26389E-03
.28655E-03
.31659E-03
.34919E-03
.45300E-03
.52042E-03
.59469E-03
.67634E-03
.77167E-03
.87849E-03
.56172E-02

.59184E-02

SHOCK DISTANCE =

.16971E-01

STINF =

.52559E-02

CFINF =

150.00

AT FI =

M TOTAL

M

P

M

Y

U

Y

.55093E+01
.55724E+01
.56424E+01
.57193E+01
.58840E+01

.55093E+01
.55702E+01
.56326E+01
.56956E+01
.57593E+01

.22198E-01
.22207E-01
.22216E-01
.22226E-01
.22237E-01

.42976E-02
.88444E-02
.13390E-01
.18300E-01

.18582E-04
.50422E-04
.19443E-03
.37475E-03

.12569E-01
.26186E-01
.40809E-01
.56691E-01

.22199E-04
.46619E-04
.73257E-04
.10267E-03

.13542E+03	.74072E-01	.63003E-03	.23001E-01	.22240E-01	.52234E+01	.59910E+01
.17149E+03	.92875E-01	.10007E-02	.29350E-01	.22262E-01	.58064E+01	.60018E+01
.21089E+03	.11304E+00	.14765E-02	.34991E-01	.22274E-01	.59408E+01	.61298E+01
.23292E+03	.12307E+00	.17713E-02	.37850E-01	.22282E-01	.59761E+01	.61912E+01
.25471E+03	.13480E+00	.20804E-02	.40649E-01	.22293E-01	.60032E+01	.62578E+01
.27804E+03	.14662E+00	.24620E-02	.43598E-01	.22297E-01	.60303E+01	.63299E+01
.30191E+03	.15048E+00	.28621E-02	.46474E-01	.22304E-01	.60547E+01	.64033E+01
.32467E+03	.15484E+00	.32722E-02	.49154E-01	.22320E-01	.60994E+01	.65670E+01
.34129E+03	.15950E+00	.36133E-02	.51777E-01	.22337E-01	.61340E+01	.67567E+01
.35772E+03	.16447E+00	.39689E-02	.54169E-01	.22361E-01	.61583E+01	.69566E+01
.37407E+03	.16970E+00	.43170E-02	.56160E-01	.22373E-01	.61664E+01	.71822E+01
.39034E+03	.17447E+00	.46489E-02	.57578E-01	.22390E-01	.61598E+01	.74488E+01
.40657E+03	.17934E+00	.50195E-02	.59145E-01	.22409E-01	.61194E+01	.77418E+01
.42280E+03	.18433E+00	.53622E-02	.60755E-01	.22434E-01	.60486E+01	.80933E+01
.43903E+03	.18933E+00	.57144E-02	.62393E-01	.22444E-01	.59354E+01	.84928E+01
.45526E+03	.19433E+00	.60749E-02	.64060E-01	.20776E-01	.12026E+01	.13800E+02

AT PI = 160.00 CFINF = .50243E-02 STINF = .15955E-01 SHOCK DISTANCE = .61387E-02

Y	U	V	W	P	H	H TOTAL
0.	0.	0.	0.	0.	0.	0.
.23026E-04	.12462E-01	.17899E-04	.29138E-02	.20803E-01	.55093E+01	.55093E+01
.48354E-04	.25964E-01	.77052E-04	.55950E-02	.20811E-01	.55607E+01	.55708E+01
.75905E-04	.40460E-01	.10851E-03	.92220E-02	.20820E-01	.56297E+01	.56388E+01
.10649E-03	.56204E-01	.36417E-03	.12621E-01	.20828E-01	.56915E+01	.57135E+01
.14045E-03	.73429E-01	.62116E-03	.15211E-01	.20839E-01	.57542E+01	.57967E+01
.17787E-03	.92059E-01	.97651E-03	.19338E-01	.20849E-01	.58170E+01	.58908E+01
.21874E-03	.11263E+00	.14442E-02	.23747E-01	.20862E-01	.58801E+01	.59937E+01
.24120E-03	.12206E+00	.17340E-02	.27631E-01	.20872E-01	.59402E+01	.61081E+01
.26365E-03	.13358E+00	.20481E-02	.27631E-01	.20872E-01	.59402E+01	.61081E+01
.28400E-03	.14520E+00	.24166E-02	.29540E-01	.20885E-01	.59978E+01	.62352E+01
.31315E-03	.15607E+00	.28148E-02	.31500E-01	.20898E-01	.60492E+01	.63772E+01
.36784E-03	.16210E+00	.37755E-02	.35465E-01	.20917E-01	.60949E+01	.65357E+01
.42828E-03	.20946E+00	.49626E-02	.39347E-01	.20925E-01	.61310E+01	.67130E+01
.49506E-03	.23913E+00	.64000E-02	.43847E-01	.20947E-01	.61572E+01	.69134E+01
.56874E-03	.27128E+00	.81521E-02	.46475E-01	.20952E-01	.61677E+01	.71381E+01
.64990E-03	.30610E+00	.10218E-01	.49511E-01	.20974E-01	.61598E+01	.73911E+01
.73913E-03	.34381E+00	.12654E-01	.52003E-01	.20975E-01	.61265E+01	.76762E+01
.84332E-03	.38725E+00	.15647E-01	.53863E-01	.20993E-01	.60592E+01	.80190E+01

.95767E-03
 .61387E-02
 .19123E-01
 .66567E-01
 .54710E-01
 .68110E-01
 .20908E-01
 .18091E-01
 .59500E+01
 .11517E+01
 .64092E+01
 .13800E+02

AT FI = 170.00 CFINE = .45007E-02 SFINE = .15407E-01 SHOCK DISTANCE = .32688E-02

Y U V W P H M TOTAL

0.	0.	0.	0.	0.	0.	0.	0.
.23513E-04	.12413E-01	.17412E-04	.14712E-02	.26007E-01	.55093E+01	.55093E+01	.55093E+01
.49379E-04	.29461E-01	.75095E-04	.30323E-02	.20014E-01	.55679E+01	.55679E+01	.55679E+01
.77594E-04	.10299E-01	.15428E-03	.46641E-02	.28031E-01	.56281E+01	.56281E+01	.56281E+01
.10675E-03	.55576E-01	.35651E-03	.63845E-02	.20042E-01	.56893E+01	.56893E+01	.56893E+01
.14344E-03	.73127E-01	.60873E-03	.82077E-02	.20053E-01	.57515E+01	.57515E+01	.57515E+01
.18164E-03	.91673E-01	.95626E-03	.10090E-01	.20063E-01	.58166E+01	.58166E+01	.58166E+01
.22337E-03	.11155E+00	.14190E-02	.12021E-01	.20072E-01	.58769E+01	.58769E+01	.58769E+01
.24631E-03	.12232E+00	.17059E-02	.13920E-01	.20079E-01	.59370E+01	.59370E+01	.59370E+01
.26924E-03	.13299E+00	.20153E-02	.13993E-01	.20083E-01	.59967E+01	.59967E+01	.59967E+01
.29451E-03	.14463E+00	.23819E-02	.15011E-01	.20091E-01	.60210E+01	.60210E+01	.60210E+01
.31979E-03	.15616E+00	.27743E-02	.13963E-01	.20095E-01	.60459E+01	.60459E+01	.60459E+01
.37563E-03	.18125E+00	.37275E-02	.17975E-01	.20114E-01	.60933E+01	.60933E+01	.60933E+01
.43736E-03	.20045E+00	.49033E-02	.19940E-01	.20118E-01	.61312E+01	.61312E+01	.61312E+01
.50555E-03	.22792E+00	.63523E-02	.21823E-01	.20139E-01	.61532E+01	.61532E+01	.61532E+01
.58079E-03	.26965E+00	.81014E-02	.23571E-01	.20139E-01	.61890E+01	.61890E+01	.61890E+01
.66367E-03	.30444E+00	.10140E-01	.25124E-01	.20159E-01	.61620E+01	.61620E+01	.61620E+01
.75479E-03	.34189E+00	.12846E-01	.26403E-01	.20156E-01	.61311E+01	.61311E+01	.61311E+01
.86119E-03	.38500E+00	.15600E-01	.27353E-01	.20160E-01	.60669E+01	.60669E+01	.60669E+01
.97617E-03	.43187E+00	.19252E-01	.27635E-01	.20155E-01	.59590E+01	.59590E+01	.59590E+01
.11075E-02	.48320E+00	.23316E-01	.27633E-01	.20160E-01	.57991E+01	.57991E+01	.57991E+01
.12480E-02	.53950E+00	.28013E-01	.26724E-01	.20155E-01	.55719E+01	.55719E+01	.55719E+01
.14050E-02	.60065E+00	.33158E-01	.25013E-01	.20078E-01	.52833E+01	.52833E+01	.52833E+01
.16293E-02	.66753E+00	.39034E-01	.22622E-01	.20072E-01	.48439E+01	.48439E+01	.48439E+01
.18693E-02	.74042E+00	.45353E-01	.18992E-01	.19001E-01	.42966E+01	.42966E+01	.42966E+01
.21962E-02	.81850E+00	.52627E-01	.14613E-01	.19777E-01	.35682E+01	.35682E+01	.35682E+01
.24318E-02	.89799E+00	.59912E-01	.10393E-01	.15376E-01	.27143E+01	.27143E+01	.27143E+01
.26676E-02	.96218E+00	.67224E-01	.66511E-02	.19098E-01	.18196E+01	.18196E+01	.18196E+01
.29033E-02	.98040E+00	.72144E-01	.57062E-02	.18470E-01	.12949E+01	.12949E+01	.12949E+01
.31391E-02	.98520E+00	.72963E-01	.73797E-02	.18123E-01	.11304E+01	.11304E+01	.11304E+01
.33743E-02	.99044E+00	.73064E-01	.10060E-01	.17669E-01	.11307E+01	.11307E+01	.11307E+01
.36093E-02	.99070E+00	.72754E-01	.12843E-01	.17285E-01	.11749E+01	.11749E+01	.11749E+01
.38445E-02	.99134E+00	.72361E-01	.15933E-01	.16804E-01	.11591E+01	.11591E+01	.11591E+01
		.71905E-01	.19365E-01	.16645E-01	.11468E+01	.11468E+01	.11468E+01

.40796E-02	.99166E+00	.71507E-01	.22327E-01	.16495E-01	.11358E+01	.13795E+02
.43148E-02	.99185E+00	.70962E-01	.25551E-01	.15509E-01	.11297E+01	.13795E+02
.45499E-02	.99195E+00	.70825E-01	.28943E-01	.16394E-01	.11294E+01	.13795E+02
.47791E-02	.99190E+00	.70685E-01	.31894E-01	.16754E-01	.11242E+01	.13795E+02
.49849E-02	.99182E+00	.71008E-01	.34940E-01	.16913E-01	.11241E+01	.13795E+02
.51672E-02	.99171E+00	.71350E-01	.38302E-01	.17060E-01	.11253E+01	.13795E+02
.53317E-02	.99160E+00	.71819E-01	.41650E-01	.17191E-01	.11269E+01	.13795E+02
.54787E-02	.99151E+00	.72185E-01	.45339E-01	.17305E-01	.11284E+01	.13795E+02
.56139E-02	.99142E+00	.72599E-01	.49607E-01	.17412E-01	.11306E+01	.13795E+02
.57374E-02	.99136E+00	.72815E-01	.53514E-01	.17497E-01	.11321E+01	.13795E+02
.58490E-02	.99131E+00	.73076E-01	.57424E-01	.17580E-01	.11335E+01	.13795E+02
.59489E-02	.99126E+00	.73192E-01	.61297E-01	.17623E-01	.11345E+01	.13795E+02
.60395E-02	.99123E+00	.73415E-01	.65135E-01	.17703E-01	.11355E+01	.13795E+02
.61218E-02	.99131E+00	.72989E-01	.68979E-01	.17637E-01	.11347E+01	.13795E+02
.61982E-02	.99104E+00	.74343E-01	.74822E-01	.17950E-01	.11388E+01	.13795E+02
.62688E-02	.99256E+00	.66456E-01	.34951E-01	.16375E-01	.11176E+01	.13800E+02

AT FI = 150.00 CFIMF = .48619E-02 STIMF = .15235E-01 SHOCK DISTANCE = .63111E-02

Y U V W P M H TOTAL

0.	0.	0.	0.	.19749E-01	.55893E+01	.55893E+01
.23672E-04	.12398E-01	.17212E-04	.27867E-16	.19757E-01	.55676E+01	.55695E+01
.49712E-04	.25872E-01	.79270E-04	.58273E-16	.19769E-01	.55277E+01	.55362E+01
.78118E-04	.40248E-01	.18244E-03	.91185E-16	.19773E-01	.56886E+01	.57094E+01
.10948E-03	.55944E-01	.35314E-03	.12725E-15	.19783E-01	.57507E+01	.57907E+01
.14441E-03	.73841E-01	.68322E-03	.15714E-15	.19792E-01	.58137E+01	.58812E+01
.18247E-03	.91544E-01	.95087E-03	.21183E-15	.19805E-01	.58760E+01	.59833E+01
.22488E-03	.11140E+00	.14076E-02	.25881E-15	.19812E-01	.59362E+01	.60950E+01
.27497E-03	.12219E+00	.18926E-02	.32458E-15	.19819E-01	.59899E+01	.61569E+01
.27105E-03	.13208E+00	.20002E-02	.33173E-15	.19824E-01	.59934E+01	.62192E+01
.29649E-03	.14442E+00	.23649E-02	.37963E-15	.19831E-01	.60211E+01	.62882E+01
.32194E-03	.15543E+00	.27552E-02	.43886E-15	.19835E-01	.60463E+01	.63576E+01
.37817E-03	.18847E+00	.37843E-02	.44332E-15	.19854E-01	.60930E+01	.65124E+01
.44830E-03	.20811E+00	.48824E-02	.53598E-15	.19857E-01	.61314E+01	.66860E+01
.50896E-03	.23749E+00	.63225E-02	.55887E-15	.19877E-01	.61985E+01	.68811E+01
.58471E-03	.26439E+00	.80710E-02	.68402E-15	.19876E-01	.61709E+01	.71087E+01
.65815E-03	.39349E+00	.10152E-01	.79546E-15	.19895E-01	.61646E+01	.73480E+01
.79988E-03	.44144E+00	.12825E-01	.92828E-15	.19888E-01	.61345E+01	.76270E+01
.86699E-03	.58444E+00	.15683E-01	.11212E-14	.19901E-01	.60700E+01	.79638E+01

.98476E-03	.43160E+00	.19275E-01	-.13207E-14	.19885E-01	.59637E+01	.82462E+01
.63111E-02	.99369E+00	.56080E-01	-.71319E-15	.15771E-01	.11852E+01	.13800E+02

APPENDIX F
PROGRAM LISTING


```

      E      ET(50),FI(20),X(31),
      E      INETFI(20),INETFI(50),
      E      V8(31,20),H8(31,20),
      E      COEFF(31,20),DEL(294),RTSINE(294),
      E      WORK1(1,1),WORK2(1),WORK3(1),WORK4(1)
      EQUIVALENCE (INETFI(1),INETFI(1))
      DIMENSION
      E      U(1,1), UJPI(1,1), UJMI(1,1), V(1,1), VJPI(1,1), VJMI(1,1),
      E      W(1,1), WJPI(1,1), WJMI(1,1), H(1,1), HJPI(1,1), HJMI(1,1),
      E      P(1,1), PJPI(1,1), PJMI(1,1), ZI(1,1), ZIPI(1,1), ZIJMI(1,1),
      EQUIVALENCE ( U (1,1),DEPVAR(1,1)), ( UJPI(1,1),DEPVAR(1,2)),
      E      ( UJMI(1,1),DEPVAR(1,3)), ( V (1,1),DEPVAR(1,4)),
      E      ( VJPI(1,1),DEPVAR(1,5)), ( VJMI(1,1),DEPVAR(1,6)),
      E      ( W (1,1),DEPVAR(1,7)), ( WJPI(1,1),DEPVAR(1,8)),
      E      ( WJMI(1,1),DEPVAR(1,9)), ( H (1,1),DEPVAR(1,10)),
      E      ( HJPI(1,1),DEPVAR(1,11)), ( HJMI(1,1),DEPVAR(1,12)),
      E      ( P (1,1),DEPVAR(1,13)), ( PJPI(1,1),DEPVAR(1,14)),
      E      ( PJMI(1,1),DEPVAR(1,15)), (ZI (1,1),DEPVAR(1,16)),
      E      ( ZIPI(1,1),DEPVAR(1,17)), (ZIJMI(1,1),DEPVAR(1,18))
      DIMENSION A(6,6,1),B(6,6,1),C(6,6,1),F(6,1),
      E      DELU(1),DELV(1),DELM(1),DELU(1),DELV(1),DELM(1),DELZ(1)
      EQUIVALENCE (A(1,1,1),ABCFD(1,1)), (B(1,1,1),ABCFD(1,37)),
      E      (C(1,1,1),ABCFD(1,73)), (F(1,1),ABCFD(1,109)),
      E      (DELU(1),ABCFD(1,115)), (DELV(1),ABCFD(1,116)),
      E      (DELM(1),ABCFD(1,117)), (DELM(1),ABCFD(1,118)),
      E      (DELP(1),ABCFD(1,119)), (DELZ(1),ABCFD(1,120))
      EQUIVALENCE (A(1),WORK1(1))
      EQUIVALENCE (WORK2(1),WORK3(1),WORK4(1))
      DIMENSION UNEW(1,1),VNEW(1,1),WNEW(1,1),PNEW(1,1),
      E      HNEW(1,1),ZINEW(1,1),
      E      V8NEW(1,1),H8NEW(1,1)
      EQUIVALENCE (VBNEW(1,1),ABCFD(1,31)), (HBNEW(1,1),CCOFF(1,1))
      DIMENSION ETNEW(1),FINEW(1)
      EQUIVALENCE (ETNEW(1),ABCFD(1,1)), (FINEW(1),ABCFD(1,2))
      EQUIVALENCE (UI(1,1),UNEW(1,1)), (VI(1,1),VNEW(1,1)),
      E      (W(1,1),WNEW(1,1)), (P(1,1),PNEW(1,1)),
      E      (H(1,1),HNEW(1,1)),
      E      (Z(1,1),ZINEW(1,1))
      COMMON YI(108)
      COMMON /DVARS/DEPVAR
      COMMON /RIGMAT/ COEFF
      COMMON /SE0/ ABCFD
      COMMON /CONST/CONSTC,SINTC,REINF,PRINF,ME,PREFINF,RPRRE,PREME,GM2,
      E      MINF,ALFA,SINALF,CTCA,STCA,STCA,CTSA,PINF,PBAR,SPROP

```

```

COMMON /VARY/XJMI,XJ,XJPI,DX,DXJMI,JMI,J,JPI
COMMON /PUNCH/ ITAPE
LOGICAL MOD
C THE FOLLOWING PARAMETERS ARE INPUT WITH NAMELIST
C GAMMA = RATIO OF SPECIFIC HEATS
C MINF = FREESTREAM MACH NUMBER
C THETAC = CONE HALF-ANGLE (DEG)
C KEINF = FREESTREAM REYNOLDS NUMBER (/FT)
C PRINF = FREESTREAM PRANDTL NUMBER
C ALFA = ANGLE OF ATTACK (DEG)
C PINF = DIMENSIONLESS FREESTREAM PRESSURE
C SPROP = SUTHERLAND CONSTANT USED IN VISCOSITY LAW
C VJ = NUMBER OF X-STATIONS
C VK = NUMBER OF Y-STATIONS
C NL = NUMBER OF PHI-STATIONS
C MOD = .TRUE. OR .FALSE. DEPENDING ON WHETHER THE INITIAL
C CONDITIONS ARE TO BE MODIFIED OR NOT, DEFAULT=.FALSE.
C ITAPE = 0 NO OUTPUT ON TAPE2, THIS IS THE DEFAULT VALUE
C = N OUTPUT SOLUTION ON TAPE2 EVERY NTH X-STATION.
C
C NAMELIST /INPUT/ GAMMA,MINF,THETAC,REINF,PRINF,ALFA,
C PINF,SPROP,NJ,NK,NL,MOD,ITAPE
C
C J = 0
C MOD = .FALSE.
C ITAPL=0
C READ (5,INPUT)
C WRITE (6,INPUT)
C THETAC=THETAC*.0174532925199433
C ALFA=ALFA*.0174532925199433
C REINF=1./REINF
C PRPRE=RRREINF/PRINF
C ME=(GAMMA-1.)*MINF*MINF
C VELTNF = 1.
C HBAR = 1. + ME/2.
C RREME=ME*RRREINF
C GM2=GAMMA*MINF*MINF
C COSTC=COS(THETAC)
C SINIC=SIN(THETAC)
C COSALF=COS(ALFA)
C SINALF=SIN(ALFA)
C CTCA=COSTC*COSALF
C STSA=SINIC*SINALF
C STCA=SINIC*COSALF
C CTSA=COSTC*SINALF
C
C OBTAIN THE BOUNDARY CONDITIONS AND THE INITIAL CONDITIONS.

```

```

CALL BCIC (NJ,NK,NL,U,V,W,H,P,ZI,UJM1,VJM1,HJM1,PJM1,ZIJM1,
      ET,FI,X,VR,HB)
      01330
      01340
      01350
      01360
      01370
      01380
      01390
      01400
      01410
      01420
      01430
      01440
      01450
      01460
      01470
      01480
      01490
      01500
      01510
      01520
      01530
      01540
      01550
      01560
      01570
      01580
      01590
      01600
      01610
      01620
      01630
      01640
      01650
      01660
      01670
      01680
      01690
      01700
      01710
      01720
      01730
      01740
      01750
      01760

      6. REWJND 3
      NEWK = NK
      NEWNL = NL
      IF (.NOT.MOD) GO TO 100
      C   OUTPUT THE INITIAL CONDITIONS BEFORE THEY ARE MODIFIED.
      C   CALL OUTPUT (NK,NL,X(I),ET,FI,U,V,W,H,P,ZI)
      C   IF THE SOLUTION IS TO BE MODIFIED READ IN A NEW VALUE FOR
      C   NK AND/OR NL.
      READ (5,5010) NEWK,NEWNL
      5010 FORMAT (2I5)
      IF (NEWK.LE.0) GO TO 50
      NEWK = NEWK
      C   READ IN A NEW NORMAL DISTRIBUTION.
      READ (5,5020) (ETNEW(K),K=1,NEWK)
      5020 FORMAT (6E12.4)
      DO 40 K=1,NEWK
      ETNEW(K) = ETNEW(K) / ETNEW(NEWK)
      40 CONTINUE
      ETNEW(1) = 0.0
      ETNEW(NEWK) = 1.0
      GO TO 55
      50 CONTINUE
      DO 52 K=1,NK
      ETNEW(K) = ET(K)
      52 CONTINUE
      55 CONTINUE
      IF (NEWNL.LE.0) GO TO 70
      NEWNL = NEWNL
      C   READ IN A NEW CIRCUMFERENTIAL DISTRIBUTION (DEG).
      READ (5,5020) (FINEW(L),L=1,NEWNL)
      DO 60 L=1,NEWNL
      FINEW(L) = FINEW(L) * .01745329252
      60 CONTINUE
      FINEW(1) = 0.0
      FINEW(NEWNL) = 180.00 * .01745329252
      GO TO 75
      70 CONTINUE
      DO 72 L=1,NL
      FINEW(L) = FILL
      72 CONTINUE
      75 CONTINUE
      C   INTERPOLATE TO OBTAIN THE SOLUTION AT THE NEW MESH

```

```

C      DISTRIBUTION FOR EACH OF THE INPUT PLANES.
      CALL MODIFY (NK,NL,NEWNK,NEWNL,ET,FI,ETNEW,FINEW,
      C      UJMI,UJPI,UJMI,VJMI,VJPI,VJMI,WJMI,WJPI,WJMI,
      C      PJMI,PJPI,PJMI,HJMI,HJPI,HJMI,
      C      ZIUMI,ZIUMI,ZIUMI,
      C      UNEW,VNEW,VNEW,PNEW,HNEW,ZINEW,
      C      NJ,VB,HB,VBNEW,HBNEW)
      CALL MODIFY (NK,NL,NEWNK,NEWNL,ET,FI,ETNEW,FINEW,
      C      UJMI,UJPI,UJMI,VJMI,VJPI,VJMI,WJMI,WJPI,WJMI,
      C      PJMI,PJPI,PJMI,HJMI,HJPI,HJMI,
      C      ZIUMI,ZIUMI,ZIUMI,
      C      UNEW,VNEW,VNEW,PNEW,HNEW,ZINEW,
      C      NJ,VB,HB,VBNEW,HBNEW)
      NK = NEWNK
      NL = NEWNL
      WRITE (6,INPUT)
      100 CONTINUE
      REMIND 4
      WRITE (4) GAMMA,MINF,THE TAC,REINF,PRINF,ALFA,PINF,SPROP,NJ,NK,NL
      C      OUTPUT THE INITIAL CONDITIONS
      CALL OUTPUT (NK,NL,XI1,ET,FI,U,V,W,H,P,ZI)
      NKMI=NK-1
      NKMI6=NKMI*6
      NL5=NL*5
      CALL FLOFLODINJ,NK,NL,NKMI,NKMI6,NL5,U,V,W,H,P,ZI,UJPI,VJPI,
      C      UJPI,HJPI,PJPI,ZIUMI,UJMI,VJMI,WJMI,HJMI,PJMI,
      C      ZIUMI,VB,HB,
      C      DELU,DELV,DELU,DELV,DELU,DELV,DELU,DELV,
      C      INETFI,INFETI,KSUP,PJMI,FI,
      C      ET,FI,XA,B,C,F,DEL,RTSIDE,WORK1,WORK2,
      C      WORK3,WORK4)
      STOP
      END
      SUBROUTINE FLOFLO (NJ,NK,NL,NKMI,NKMI6,NL5,U,V,W,H,P,ZI,UJPI,VJPI,
      C      UJPI,HJPI,PJPI,ZIUMI,UJMI,VJMI,WJMI,HJMI,PJMI,
      C      ZIUMI,VB,HB,
      C      DELU,DELV,DELU,DELV,DELU,DELV,DELU,DELV,
      C      INETFI,INFETI,KSUP,PJMI,FI,
      C      ET,FI,XA,B,C,F,DEL,RTSIDE,WORK1,WORK2,
      C      WORK3,WORK4)
      C      THIS SUBROUTINE COMPUTES THE INITIAL GUESS TO THE SOLUTION
      C      AT THE NEXT X-STATION, AND CONTRIC'S THE MARCHING IN X.
      REAL ME,MINF
      LEVEL 2,U,UJPI,UJMI,V,VJPI,VJMI,W,WJPI,WJMI,P,PJPI,PJMI,

```

```

C      H,HJPI,HJMI,ZI,ZIJP1,ZIJM1,      02210
C      DELU,DELV,DELM,DELP,DELM,DELZI,      02220
C      A,B,C,F,WORK1      02230
C      DIMENSION U(NK,NL),V(NK,NL),W(NK,NL),H(NK,NL),P(NK,NL),Z(NK,NL),      02240
C      UJPI(K,NL),VJPI(K,NL),WJPI(K,NL),HJPI(K,NL),      02250
C      PJPI(K,NL),ZJPI(K,NL),      02260
C      UJMI(K,NL),VJMI(K,NL),WJMI(K,NL),HJMI(K,NL),      02270
C      PJMI(K,NL),ZJMI(K,NL),      02280
C      VE(NJ,NL),HB(NJ,NL),      02290
C      ET(NK),FI(NL),X(NJ)      02300
C      DIMENSION DELU(NK),DELV(NK),DELM(NK),DELP(NK),DELZI(NK)      02310
C      DIMENSION INETI(NL),INET(NK)      02320
C      DIMENSION A(6,6,NK),B(6,6,NK),C(6,6,NK),F(6,NK)      02330
C      DIMENSION DEL(NKM16),RTSIDE(NKM16)      02340
C      DIMENSION WORK1(1),WORK2(1),WORK3(1),WORK4(1)      02350
C      COMMON /CONST/COSTC,SINTC,REINF,PRINF,ME,PREINF,RPRRE,RREME,GM2,      02360
C      MINF,ALFA,SINLAF,CTCA,STCA,CTSA,PINF,FBAR,$PROP      02370
C      COMMON /VARY/XJMI,XJ,XJPI,DX,DXJMI,JMI,J,JPI      02380
C      COMMON /ITERATE/ITER,ITCOUN      02390
C      J=1      02400
C      *****THE FOLLOWING CARD MUST BE SET CORRECTLY FOR EACH RUN.*****      02410
C      *****THE NUMBER PUT ON IT MUST BE EQUAL TO THE X-STEP TAKEN TO****      02420
C      *****GET TO THE PLANE OF INITIAL CONDITIONS READ IN FROM THE****      02430
C      *****PREVIOUS X-STATION. THIS IS SO THE INITIAL BACKWARDS*****      02440
C      *****EVALUATION OF D/DX WILL BE CORRECT.*****      02450
C      XJ = X(1) - .0012      02460
C      XJPI=X(1)      02470
C      200 CONTINUE      02480
C      JMI=J-1      02490
C      JPI=J+1      02500
C      XJMI=XJ      02510
C      XJ=XJPI      02520
C      XJPI=X(JPI)      02530
C      DXJMI=XJ-XJMI      02540
C      DX=XJPI-XJ      02550
C      DO 25 LDUM=1,NL      02560
C      C      OBTAIN THE INITIAL GUESS      02570
C      DO 20 K=1,NK      02580
C      UJPI(K,LDUM)=U(K,LDUM)+(U(K,LDUM)-UJMI(K,LDUM))*DX/DXJMI      02590
C      VJPI(K,LDUM)=V(K,LDUM)+(V(K,LDUM)-VJMI(K,LDUM))*DX/DXJMI      02600
C      WJPI(K,LDUM)=W(K,LDUM)+(W(K,LDUM)-WJMI(K,LDUM))*DX/DXJMI      02610
C      HJPI(K,LDUM)=H(K,LDUM)+(H(K,LDUM)-HJMI(K,LDUM))*DX/DXJMI      02620
C      PJPI(K,LDUM)=P(K,LDUM)+(P(K,LDUM)-PJMI(K,LDUM))*DX/DXJMI      02630
C      ZJPI(K,LDUM)=Z(K,LDUM)+(Z(K,LDUM)-ZJMI(K,LDUM))*DX/DXJMI      02640

```

```

20 CONTINUE
25 CONTINUE
DO 30 L=1,NL
INTEFI(L) = 1
30 CONTINUE
DO 275 ITER,N=1,40
ITER = 0
C CALL THE SUBROUTINE THAT ADVANCES THE SOLUTION TO THE
C NEXT X-LOCATION USING A METHOD THAT IS IMPLICIT IN ETA.
C AND ITERATIVE IN PHI.
CALL IMPEIA (NJ,NK,NL,NKMI,NKMI6,U,V,W,H,P,ZI,UJPI,VJPI,WJPI,
HJPI,PJPI,ZIUPI,UJMI,VJMI,HJMI,PJMI,ZIJMI,
VB,HB,
DELU,DELV,DELM,DELH,DELP,DELZI,
INTEFI,
ET,FI,X,A,B,C,F,DEL,RTSIDE,WORK1,WORK2,WORK3,WORK4)
WRITE (6,6973) ITER,(INTEFI(KJ),KJ=1,NL)
IF (ITER.LT.0) GO TO 287
IF (ITER.EQ.0) GO TO 276
275 CONTINUE
276 CONTINUE
6973 FORMAT (* ITER,INS *,40I2)
287 CONTINUE
C OUTPUT THE SOLUTION AT X(J+1).
CALL OUTPUT (NK,NL,XJPI,ET,FI,UJPI,VJPI,WJPI,HJPI,PJPI,
ZIUPI)
IF (ITER.LT.0) RETURN
J=J+1
IF (J.GE.NJ) GO TO 300
REDEFINE THE SOLUTION AT X(J) AND X(J-1).
DO 290 L=1,NL
DO 290 K=1,NK
QZ1=U(K,L)
U(K,L)=UJPI(K,L)
UJMI(K,L)=QZ1
QZ1=V(K,L)
V(K,L)=VJPI(K,L)
VJMI(K,L)=QZ1
QZ1=W(K,L)
W(K,L)=WJPI(K,L)
WJMI(K,L)=QZ1
QZ1=H(K,L)
H(K,L)=HJPI(K,L)
HJMI(K,L)=QZ1

```

```

QZ1=P(K,L)
P(K,L)=PJPI(K,L)
PJMI(K,L)=QZ1
QZ1=ZI(K,L)
ZI(K,L)=ZIJPI(K,L)
ZIJMI(K,L)=QZ1
290 CONTINUE
300 CONTINUE
RETURN
END
SUBROUTINE IMPETA (NJ,NK,NL,NKM16,U,V,W,H,P,ZI,UJPI,VJPI,
& WJPI,HJPI,PJPI,ZIJPI,UJMI,VJMI,WJMI,HJMI,PJMI,
& ZIJMI,VB,HB,
& DELU,DELV,DELH,DELH,DELP,DELZI,
& INETFI,
& ET,FI,X,A,B,C,F,DEL,RTSIDE,WORK1,WORK2,
& WORK3,WORK4)
C THIS SUBROUTINE CONTROLS THE IMPLICIT IN ETA STEPS.
REAL MUJ,MJLPI,MJLMI
REAL MNLM1,MNLP1
REAL MU,MUXMI,MUKPI,MULMI,MULPI,ME
REAL MINF
LOGICAL SUBSON,SUBPI
LOGICAL LINL
LEVEL 2,U,UJPI,UJMI,V,VJPI,VJMI,W,WJPI,WJMI,P,PJPI,PJMI,
& H,HJPI,HJMI,ZI,ZIJPI,ZIJMI,
& DELU,DELV,DELH,DELP,DELH,DELZI,
& A,B,C,F,WORK1
DIMENSION U(NK,NL),V(NK,NL),W(NK,NL),H(NK,NL),P(NK,NL),ZI(NK,NL),
& UJPI(NK,NL),VJPI(NK,NL),WJPI(NK,NL),HJPI(NK,NL),
& PJPI(NK,NL),ZIJPI(NK,NL),
& UJMI(NK,NL),VJMI(NK,NL),WJMI(NK,NL),HJMI(NK,NL),
& PJMI(NK,NL),ZIJMI(NK,NL),
& VB(NJ,NL),HB(NJ,NL),
& ET(NK),FI(NL),X(NJ)
DIMENSION DELU(NK),DELV(NK),DELH(NK),DELP(NK),DELZI(NK)
DIMENSION INETFI(NL)
DIMENSION A(6,6,NK),B(6,6,NK),C(6,6,NK),F(6,NK)
DIMENSION DEL(NKM16),RTSIDE(NKM16)
DIMENSION WORK1(1),WORK2(1),WORK3(1),WORK4(1)
COMMON OCDE,DCDF,DCHKMI,DCH,DCHKPI,DDHLM1,DDULMI,DDVLM1,
& DDWLM1,DF,DHDE,DHDF,DHDE,DHDF,DHDKMI,DHDKPI,DRPKMI,DRPKPI,
& DPDE,DPDF,DPDX,DRHKMI,DRH,DRHKPI,DRPKMI,DRPKPI,

```

```

03090
03100
03110
03120
03130
03140
03150
03160
03170
03180
03190
03200
03210
03220
03230
03240
03250
03260
03270
03280
03290
03300
03310
03320
03330
03340
03350
03360
03370
03380
03390
03400
03410
03420
03430
03440
03450
03460
03470
03480
03490
03500
03510
03520

```



```

3  DRUE,DRUHE,DRUIRE,DRUHRX,DRURE,DRURX,DRUUE,DRUIRE, 03530
3  DRUURX,DRUVE,DRUVRE,DRUVRX,DRUWKE,DRUMPX,DRVE,DRVHE, 03540
3  DRVHRE,DRVRE,DRVVE,DRVVRX,DRVWKE,DRVWE,DRWF,DRWHE, 03550
3  DRWHF,DRWUE,DRWUF,DRWVE,DRWVF,DRWWE,DRWWF,DUCE,DUCF, 03560
3  DVDE,DVDF,DWDE,DWDF,DZIDF,DZIDX,DZIDE,DZHDF,C2HCF, 03570
3  DZUDE,DZUDE, DZUDF, DZUDE, DZVDF, DZVDF, DZWDE, DZWDF, 03580
3  DZWDF, DZVDF 03590
COMMON DHDX, DRODX, DUDX, DVDX, DNDX, DRDCE, DRDCF 03600
COMMON ALPHA1,ALPHA2,ALPHA3,GAMMA1,GAMMA2,GAMMA3, 03610
3  BETA2,EPS2, 03620
3  RKMI,R,RKPI,RJPI,RHOKMI,RHO,RHOKPI,CCN,MU,PHI 03630
COMMON SUBSCN,SUBP1 03640
COMMON KMI,K,KPI 03650
COMMON /CONST/COSTC,SINIC,REINF,PRINF,ME,RREINF,RPRE,RRME,GM2, 03660
3  MINF,ALFA,SINLF,CTCA,STSA,STCA,CTSA,PINF,PHAR,SPROP 03670
COMMON /VARY/XJMI,XJL,XJPI,DX,DXJMI,JMI,J,JPI 03680
COMMON /ITERATE/ ITER 03690
COMMON /QZRODY/ QZ1,QZ2,QZ3,QZ4,QZ5,QZ6 03700
3  ,QZ33,QZ42 03710
EQUIVALENCE (DF,OFIL) 03720
DATA LFLAG/-1/ 03730
3  LFLAG DETERMINES WHETHER L GOES FROM 1 TO NL CR FROM NL TO 1. 03740
LFLAG=-LFLAG 03750
L=0 03760
IF (LFLAG.EQ.-1) L=NL+1 03770
IF (NL.NE.1) DFILP1=FI(L+LFLAG+LFLAG)-FI(L+LFLAG) 03780
DO 200 LOUM=1,NL 03790
ISOLV = 0 03800
L=L+LFLAG 03810
LMI=L-LFLAG 03820
LPI=L+LFLAG 03830
LINL = .FALSE. 03840
IF ((L.NE.1.AND. L.NE.NL).OR. NL.EQ.1) LINL = .TRUE. 03850
OBTAIN THE COEFFICIENTS FOR THE FI DERIVATIVES. 03860
IF (L.NE.1.AND.L.NE.NL) GO TO 30 03870
IF L = 1 OR NL THEN ALL PHI DERIVATIVES EXCEPT TPOSE 03880
INVOLVING * AND THE SECOND DERIVATIVES MUST BE ZERC. 03890
DEFINE PARAMETERS SO THAT THIS HAPPENS AND SC THAT THERE 03900
ARE NO PROBLEMS WITH SUBSCRIPTS OR DIVISION BY ZERO. 03910
WHEN NL.NE.1 AND L=1 OR NL THEN LPI IS USED IN OBTAINING 03920
THE NONZERO PHI DERIVATIVES. LMI IS SET TO 1 AND IS NOT 03930
INVOLVED WITH NONZERO TERMS. LPI MUST BE DEFINED PROPERLY. 03940
LMI=1 03950
LPI=1 03960

```

	IF (NL.NE.1.AND.L.EQ.1) LP1=L+1	03970
	IF (NL.NE.1.AND.L.EQ.NL) LP1=L-1	03980
C	SET DFIL (= DELTA PHI) SC THAT CROSS DERIVATIVE TERMS ARE	03990
C	HANDLED PROPERLY IN SETUPE.	04000
	DFIL = 1.E+60	04010
	BETA1=0.	04020
	BETA2=0.	04030
	BETA3=0.	04040
	EPS1=0.	04050
	EPS2=0.	04060
	EPS3=0.	04070
	IF (NL.EQ.1) GO TO 40	04080
	ROFIL = 1. / (FI(LP1)-FI(L))	04090
	ROFS2 = 2.*ROFIL*ROFIL	04100
	GO TO 40	04110
	30 CONTINUE	04120
	DFIL=DFILP1	04130
	DFILP1=FI(LP1)-FI(L)	04140
	RO2FIL=2./(FI(LP1)-FI(LML))	04150
	EPS1=RO2FIL/DFIL	04160
	EPS3=RO2FIL/DFILP1	04170
	EPS2=-EPS1-EPS3	04180
	BETA1=DFILP1*EPS1*.5	04190
	BETA3=DFIL*EPS3*.5	04200
	BETA2=-BETA1-BETA3	04210
	40 CONTINUE	04220
	IF (INETFI(L).EQ.0) GO TO 127	04230
	INETFI(L) = 0	04240
C	OBTAIN THE STARTING VALUES OF THE PARAMETERS.	04250
	DETKP1=ET(2)-ET(1)	04260
	R=XJPI*SINTC+ET(1)*Z1JPI(1,L)*COSTC	04270
	RKPI=XJPI*SINTC+ET(2)*Z1JPI(2,L)*COSTC	04280
	CALL PROP (HJPI(1,L),PJPI(1,L),RHO,DRP,DRH,	04290
	WU,OMH,CON,DCH)	04300
	CALL PROP (HJPI(2,L),PJPI(2,L),RHOKPI,DRPKPI,	04310
	DRHKPI,MUKPI,DMHKPI,CONKPI,DCHKPI)	04320
C	THIS IS THE ETA LOOP FOR A SPECIFIC VALUE OF FI.	04330
C	THE LIMITS ARE FROM 2 TO NK-1 SINCE THE BOUNDARY	04340
C	CONDITIONS	04350
C	(K=1 AT THE BODY, K=NK AT THE SHOCK) ARE HANDLED	04360
C	SEPARATELY.	04370
	DO 100 K=2,NKMI	04380
	KMI=K-1	04390
	KPI=K+1	04400
C	OBTAIN THE COEFFICIENTS FOR THE ETA DERIVATIVES.	

DETK=DETKP1	04410
DETKP1=ET(KP1)-ET(K)	04420
RD2ETK=2./1ET(KP1)-ET(KM1))	04430
GAMMA1=RD2ETK/DETK	04440
GAMMA3=RD2ETK/DETKP1	04450
GAMMA2=-GAMMA1-GAMMA3	04460
ALPHA1=-DETKP1/GAMMA1*.5	04470
ALPHA3=DETK/GAMMA3*.5	04480
ALPHA2=-ALPHA1-ALPHA3	04490
C	04500
OBTAIN THE NEEDED PARAMETERS.	04510
C*****THE CONDITION DP/DETA=0 CAN BE INVOKED BY SETTING*****	04520
C*****SUBSDN = .TRUE. , IT IS SUPRESSED WHEN SUBSGN = .FALSE. *****	04530
SUBSGN = .FALSE.	04540
C*****SET SUBP1 = .TRUE. IF DP/DX IS TO BE EVALUATED EXPLICITLY*****	04550
C*****OR SET TO ZERO. FOR DP/DX IMPLICIT SET SUBP1 = .FALSE. *****	04560
SUBP1 = .TRUE.	04570
RKMI=R	04580
R=RKP1	04590
RJM1=XJ*SINTC+ET(K)*Z1(K,L)*COSTC	04600
RKPI=XJPI*SINTC+ET(KP1)*Z1(JPI(KP1,L))*COSTC	04610
RHOKM1=RHO	04620
RHO=RHOKP1	04630
CONKM1=CON	04640
CON=CONKP1	04650
MUKM1=MU	04660
MU=MUKP1	04670
DCHKM1=DCH	04680
DCH=DCHKP1	04690
DMHKM1=DMH	04700
DMH=DMHKP1	04710
DRMKM1=DRH	04720
DRH=DRMKP1	04730
DRPKM1=DRP	04740
DRP=DRPKP1	04750
CALL PROP (HJPI(KP1,L),P,JPI(KP1,L),RHOKP1,	04760
DRPKP1,DRHKP1,MUKP1,DMHKP1,CONKP1,DCHKP1)	04770
CALL PROP (H(K,L),P(K,L),RHOJPI,DZ1,DZ2,MUJ,DZ3,CONJ,CZ4)	04780
CALL PROP (HJPI(K,LMI),P,JPI(K,LMI),RHNLMI,DZ1,DZ2,MALPI,CZ3,CNLMI,	04790
DZ4)	04800
CALL PROP (HJPI(K,LPI),P,JPI(K,LPI),RHNLPI,DZ1,DZ2,MALPI,CZ3,CNLPI,	04810
DZ4)	04820
C	04830
COMPUTE SOME TERMS COMMON TO MANY OF THE DERIVATIVE	04840
C	
EXPRESSIONS.	
QZ1=ALPHA1*RHOKM1	

```

QZ2=ALPHA2*RHQ      0485C
QZ3=ALPHA3*RHOKPI    0486C
QZ4=QZ1*UJPI(KM1,L)  0487C
QZ5=QZ2*UJPI(K,L)    0488C
QZ6=QZ3*UJPI(KP1,L)  0489C
QZ7=QZ1*VJPI(KM1,L)  0490C
QZ8=QZ2*VJPI(K,L)    0491C
QZ9=QZ3*VJPI(KP1,L)  0492C
QZ10=QZ1*WJPI(KM1,L) 0493C
QZ11=QZ2*WJPI(K,L)   0494C
QZ12=QZ3*WJPI(KP1,L) 0495C

      C
      COMPUTE THE DERIVATIVES.
      DHDX=(HJPI(K,L)-H(K,L))/DX
      DRGDE = ALPHA1*RHOKM1 +ALPHA2*RHQ +ALPHA3*RHCKPI
      DRODF = BETA1*RHNLMI +BETA2*RHQ +BETA3*RHNLPI
      DRDODX=(RHQ-RHOKM1 )/DX
      DUDX=(UJPI(K,L)-U(K,L))/DX
      DVDX=(VJPI(K,L)-V(K,L))/DX
      DWDX=(WJPI(K,L)-W(K,L))/DX
      DODE=ALPHA1*CONKM1+ALPHA2*CON+ALPHA3*CCNKPI
      DODF=BETA1*CNLM1+BETA2*CON +BETA3*CNLPI
      DDHLM1=0.
      DDULMI=0.
      DDVLM1=0.
      DDWLM1=0.
      DHDX=ALPHA1*HJPI(KM1,L)+ALPHA2*HJPI(K,L)+ALPHA3*HJPI(KP1,L)
      DHDX=QETA1*H(K,LMI)+BETA2*H(K,L)+BETA3*H(K,LPI)
      DHDX=ALPHA1*HUKM1+ALPHA2*HMU+ALPHA3*HUKPI
      DHDX=BETA1*HNLMI+BETA2*HMU +BETA3*HNLPI
      DPOE=ALPHA1*PJPI(KM1,L)+ALPHA2*PJPI(K,L)+ALPHA3*PJPI(KP1,L)
      DPOF=BETA1*PJPI(K,LMI)+BETA2*PJPI(K,L)+BETA3*PJPI(K,LPI)
      DPOX=(PJPI(K,L)-P(K,L))/DX
      IF (SUBPI) DPOX = (P(K,L) - PJMI(K,L)) / DXJMI
      C*****TO SET DP/DX TO ZERO INSERT  HERE*****
      DRUE=QZ4*QZ5+QZ6
      DRUE=QZ4*HJPI(KM1,L)+QZ5*HJPI(K,L)+QZ6*HJPI(KP1,L)
      DRUE=QZ4*HJPI(KM1,L)*RKMI+QZ5*HJPI(K,L)*R+CZ6*HJPI(KP1,L)*RKPI
      DRUE=X=(RHQ*UJPI(K,L)+HJPI(K,L)*R-RHOKM1*U(K,L)+RJM1)/DX
      DRUE=QZ4*RKMI+QZ5*R+QZ6*RKPI
      DRUE=X=(RHQ*UJPI(K,L)*R-RHOKM1*U(K,L)+RJM1)/DX
      DRUE=QZ4*UJPI(KM1,L)+QZ5*UJPI(K,L)+QZ6*UJPI(KP1,L)
      DRUE=QZ4*UJPI(KM1,L)*RKMI+QZ5*UJPI(K,L)*R+CZ6*UJPI(KP1,L)*RKPI
      DRUE=X=(RHQ*UJPI(K,L)+UJPI(K,L)*R-RHOKM1*U(K,L)+RJM1)/DX
      DRUE=QZ4*VJPI(KM1,L)+QZ5*VJPI(K,L)+QZ6*VJPI(KP1,L)

```

```

DRUVRE=QZ4*VJPI(KM1,L)*RKMI+QZ5*VJPI(K,L)*R+CZ6*VJPI(KP1,L)*RKPI 05290
DRUVRX=(RHO*UJPI(K,L)*VJPI(K,L)*R-RHOJMI*U(K,L)*V(K,L)*RJM1)/DX 05300
DRUMRE=QZ4*WJPI(KM1,L)*RKMI+QZ5*WJPI(K,L)*R+CZ6*WJPI(KP1,L)*RKPI 05310
DRUMRX=(RHO*UJPI(K,L)*WJPI(K,L)*R-RHOJMI*U(K,L)*W(K,L)*RJM1)/DX 05320
DRVE=QZ7*QZP+QZ9 05330
DRVHE=QZ7*HJPI(KM1,L)+QZ8*HJPI(K,L)+QZ9*HJPI(KP1,L) 05340
DRVHRE=QZ7*HJPI(KM1,L)*RKMI+QZ8*HJPI(K,L)*R+CZ9*HJPI(KP1,L)*RKPI 05350
DRVRE=QZ7*RKMI+QZ8*R+QZ9*RKPI 05360
DRVVE=QZ7*VJPI(KM1,L)+QZ8*VJPI(K,L)+QZ9*VJPI(KP1,L) 05370
DRVVRE=QZ7*VJPI(KM1,L)*RKMI+QZ8*VJPI(K,L)*R+CZ9*VJPI(KP1,L)*RKPI 05380
DRVVRE=QZ7*WJPI(KM1,L)*RKMI+QZ8*WJPI(K,L)*R+CZ9*WJPI(KP1,L)*RKPI 05390
DRWE=QZ10+QZ11+QZ12
DRWHE=QZ10*HJPI(KM1,L)+QZ11*HJPI(K,L)+QZ12*HJPI(KP1,L) 05400
DRWUE=QZ4*WJPI(KM1,L)+QZ5*HJPI(K,L)+QZ6*WJPI(KP1,L) 05410
DRWVE=QZ7*HJPI(KM1,L)+QZ8*WJPI(K,L)+QZ9*WJPI(KP1,L) 05420
DRWVE=QZ10*HJPI(KM1,L)+QZ11*WJPI(K,L)+QZ12*WJPI(KP1,L) 05430
DRWVE=ALPHA1*UJPI(KM1,L)+ALPHA2*UJPI(K,L)+ALPHA3*UJPI(KP1,L) 05440
DUOF=BETA1*UJPI(K,L)+BETA2*UJPI(K,L)+BETA3*UJPI(K,L) 05450
DUOF=ALPHA1*VJPI(KM1,L)+ALPHA2*VJPI(K,L)+ALPHA3*VJPI(KP1,L) 05460
SVGE=ALPHA1*VJPI(KM1,L)+ALPHA2*VJPI(K,L)+ALPHA3*VJPI(KP1,L) 05470
DVDF=BETA1*VJPI(KM1,L)+BETA2*VJPI(K,L)+BETA3*VJPI(KP1,L) 05480
DWCE=ALPHA1*WJPI(KM1,L)+ALPHA2*WJPI(K,L)+ALPHA3*WJPI(KP1,L) 05490
DZIOF=BETA1*Z1JPI(K,L)+BETA2*Z1JPI(K,L)+BETA3*Z1JPI(K,L) 05500
DZIOX=(Z1JPI(K,L)-Z1(K,L))/DX 05510
DZHOE=GAMMA1*HJPI(KM1,L)+GAMMA2*HJPI(K,L)+GAMMA3*HJPI(KP1,L) 05520
DZUNE=GAMMA1*UJPI(KM1,L)+GAMMA2*UJPI(K,L)+GAMMA3*UJPI(KP1,L) 05530
DZVDE=GAMMA1*VJPI(KM1,L)+GAMMA2*VJPI(K,L)+GAMMA3*VJPI(KP1,L) 05540
DZWDE=GAMMA1*WJPI(KM1,L)+GAMMA2*WJPI(K,L)+GAMMA3*WJPI(KP1,L) 05550
IF (LINL) GO TO 75 05560
IF L = 1 OR NL AND THIS IS A NONZERO ANGLE OF ATTACK PROBLEM 05570
C THEN THE W DERIVATIVES AND SECOND DERIVATIVES WITH RESPECT 05580
C TO PHI ARE OBTAINED FROM ASSYMETRY OF W AND SYMMETRY OF THE 05590
C OTHER FUNCTIONS. 05600
DWOF=WJPI(K,LPI)*ROFIL 05610
DRWF=RHNLPI*DWOF 05620
DRWHF=HJPI(K,LPI)*DRWF 05630
DRWUF=UJPI(K,LPI)*DRWF 05640
DRWVF=VJPI(K,LPI)*DRWF 05650
DRWVF=0. 05660
DZHOEF=0. 05670
DZHOEF=ROFS2*(HJPI(K,LPI)-HJPI(K,L)) 05680
DZHOEF=0. 05690
DZUOF=RDFS2*(UJPI(K,LPI)-UJPI(K,L)) 05700
DZVDEF=0. 05710
DZWDF=RDFS2*(VJPI(K,LPI)-VJPI(K,L)) 05720

```

D2WDEF=(ALPHA1*WJPI(KM1,LP1)+ALPHA2*WJPI(K,LP1) +ALPHA3*WJPI(KP1,LP1))*RCFII	05730
D2WDF=0.	05740
D2ZIDF=RDFS2*(ZIJPI(K,LP1)-ZIJPI(K,L1))	05750
GO TO P5	05760
75 CONTINUE	05770
IF L DOES NOT = 1 OR NC THEN EVALUATE W-DERIVATIVES AND CROSS DERIVATIVES STANDARDLY.	05780
QZ13=BETA1*RHNLMI*WJPI(K,LM1)	05790
QZ14=BETA2*RHND *WJPI(K,L1)	05800
QZ15=BETA3*RHNLPI*WJPI(K,LP1)	05810
DRWF=QZ11+QZ14+QZ15	05820
ORWHF=QZ13*HJPI(K,LM1)+QZ14*HJPI(K,L1)+QZ15*HJPI(K,LP1)	05830
ORWUF=QZ13*UJPI(K,LM1)+QZ14*UJPI(K,L1)+QZ15*UJPI(K,LP1)	05840
ORWVF=QZ13*VJPI(K,LM1)+QZ14*VJPI(K,L1)+QZ15*VJPI(K,LP1)	05850
DRWVF=QZ13*WJPI(K,LM1)+QZ14*WJPI(K,L1)+QZ15*WJPI(K,LP1)	05860
DWDF=BETA1*WJPI(K,LM1)+BETA2*WJPI(K,L1)+BETA3*WJPI(K,LP1)	05870
D2HDEF=BETA1*(ALPHA1*HJPI(KM1,LM1)+ALPHA2*HJPI(K,LM1) +ALPHA3*HJPI(KP1,LM1))	05880
+BETA2*(ALPHA1*HJPI(KM1,L1)+ALPHA2*HJPI(K,L1) +ALPHA3*HJPI(KP1,L1))	05890
+BETA3*(ALPHA1*HJPI(KM1,LP1)+ALPHA2*HJPI(K,LP1) +ALPHA3*HJPI(KP1,LP1))	05900
D2HOF=EPS1*HJPI(K,LM1)+EPS2*HJPI(K,L1)+EPS3*HJPI(K,LP1)	05910
D2UDEF=BETA1*(ALPHA1*UJPI(KM1,LM1)+ALPHA2*UJPI(K,LM1) +ALPHA3*UJPI(KP1,LM1))	05920
+BETA2*(ALPHA1*UJPI(KM1,L1)+ALPHA2*UJPI(K,L1) +ALPHA3*UJPI(KP1,L1))	05930
+BETA3*(ALPHA1*UJPI(KM1,LP1)+ALPHA2*UJPI(K,LP1) +ALPHA3*UJPI(KP1,LP1))	05940
D2UDF=EPS1*UJPI(K,LM1)+EPS2*UJPI(K,L1)+EPS3*UJPI(K,LP1)	05950
D2VDEF=BETA1*(ALPHA1*VJPI(KM1,LM1)+ALPHA2*VJPI(K,LM1) +ALPHA3*VJPI(KP1,LM1))	05960
+BETA2*(ALPHA1*VJPI(KM1,L1)+ALPHA2*VJPI(K,L1) +ALPHA3*VJPI(KP1,L1))	05970
+BETA3*(ALPHA1*VJPI(KM1,LP1)+ALPHA2*VJPI(K,LP1) +ALPHA3*VJPI(KP1,LP1))	05980
D2UDF=EPS1*UJPI(K,LM1)+EPS2*UJPI(K,L1)+EPS3*UJPI(K,LP1)	05990
D2VDEF=BETA1*(ALPHA1*VJPI(KM1,LM1)+ALPHA2*VJPI(K,LM1) +ALPHA3*VJPI(KP1,LM1))	06000
+BETA2*(ALPHA1*VJPI(KM1,L1)+ALPHA2*VJPI(K,L1) +ALPHA3*VJPI(KP1,L1))	06010
+BETA3*(ALPHA1*VJPI(KM1,LP1)+ALPHA2*VJPI(K,LP1) +ALPHA3*VJPI(KP1,LP1))	06020
D2UDF=EPS1*UJPI(K,LM1)+EPS2*UJPI(K,L1)+EPS3*UJPI(K,LP1)	06030
D2VDEF=BETA1*(ALPHA1*VJPI(KM1,LM1)+ALPHA2*VJPI(K,LM1) +ALPHA3*VJPI(KP1,LM1))	06040
+BETA2*(ALPHA1*VJPI(KM1,L1)+ALPHA2*VJPI(K,L1) +ALPHA3*VJPI(KP1,L1))	06050
+BETA3*(ALPHA1*VJPI(KM1,LP1)+ALPHA2*VJPI(K,LP1) +ALPHA3*VJPI(KP1,LP1))	06060
D2UDF=EPS1*UJPI(K,LM1)+EPS2*UJPI(K,L1)+EPS3*UJPI(K,LP1)	06070
D2VDEF=BETA1*(ALPHA1*VJPI(KM1,LM1)+ALPHA2*VJPI(K,LM1) +ALPHA3*VJPI(KP1,LM1))	06080
+BETA2*(ALPHA1*VJPI(KM1,L1)+ALPHA2*VJPI(K,L1) +ALPHA3*VJPI(KP1,L1))	06090
+BETA3*(ALPHA1*VJPI(KM1,LP1)+ALPHA2*VJPI(K,LP1) +ALPHA3*VJPI(KP1,LP1))	06100
D2UDF=EPS1*UJPI(K,LM1)+EPS2*UJPI(K,L1)+EPS3*UJPI(K,LP1)	06110
D2VDEF=BETA1*(ALPHA1*VJPI(KM1,LM1)+ALPHA2*VJPI(K,LM1) +ALPHA3*VJPI(KP1,LM1))	06120
+BETA2*(ALPHA1*VJPI(KM1,L1)+ALPHA2*VJPI(K,L1) +ALPHA3*VJPI(KP1,L1))	06130
+BETA3*(ALPHA1*VJPI(KM1,LP1)+ALPHA2*VJPI(K,LP1) +ALPHA3*VJPI(KP1,LP1))	06140
D2UDF=EPS1*UJPI(K,LM1)+EPS2*UJPI(K,L1)+EPS3*UJPI(K,LP1)	06150
D2VDEF=BETA1*(ALPHA1*VJPI(KM1,LM1)+ALPHA2*VJPI(K,LM1) +ALPHA3*VJPI(KP1,LM1))	06160

```

D2WDF=EPS1*WJPI(K,L,M1)+EPS2*WJPI(K,L)+EPS3*WJPI(K,L,P1)
D2ZIDF=EPS1*ZIJPI(K,L,M1)+EPS2*ZIJPI(K,L)+EPS3*ZIJPI(K,L,P1)
R5 CONTINUE
C      CALL THE SUBROUTINE THAT SETS UP THE MATRIX ELEMENTS
C      FOR EACH VALUE OF K.
      CALL SETUPE (NK,NKM1,UJPI(I,L),VJPI(I,L),WJPI(I,L),+JPI(I,L,L),
      &      PJP(I,L,L),ZIJPI(I,L,L),
      &      ET,A,B,C,F)
C      CHECK FOR CONVERGENCE.
      SUMF = F(1,K)*F(1,K) + F(2,K)*F(2,K) + F(3,K)*F(3,K)
      &      + F(4,K)*F(4,K) + F(5,K)*F(5,K) + F(6,K)*F(6,K)
      IF (SUMF .GT. 6.E-17) ISOLV = ISOLV + 1
      IF (SUMF .LT. 6.E-14) GO TO 95
      INETPI(L) = 1
      IF (ITER.NE.-1) ITER = 1
95 CONTINUE
100 CONTINUE
C      OBTAIN THE PARAMETERS AND DERIVATIVES NEEDED IN THE
C      SHOCK BOUNDARY CONDITION EQUATIONS.
      ALPHA2=1./((ET(NK)-ET(NKM1))
      ALPHA1=-ALPHA2
      PHI=F(1,L)
      RKM1=R
      R=RKPI
      RJM1=XJ*SINTC+ET(NK)*ZI(NK,L)*COSTC
      RHOKM1=RHO
      RH0=RHOKPI
      CALL PROPRO (H(NK,L),P(NK,L),RHOKM1,DZ1,DZ2,DZ3,CZ4,DZ5,DZ6)
      CALL PROPRO (HJPI(NK,L,M1),PJPI(NK,L,M1),RHNLMI,DZ1,DZ2,DZ3,CZ4,DZ5,
      &      DZ6)
      CALL PROPRO (HJPI(NK,L,P1),PJPI(NK,L,P1),RHNLPI,DZ1,DZ2,DZ3,CZ4,DZ5,
      &      DZ6)
      DRHKM1=DRH
      DRH=DRHKPI
      DRPKM1=DRP
      DRP=DRPKPI
      DZIOX=(ZIJPI(NK,L)-ZI(NK,L))/DX
      DZIDF=BETA1*ZIJPI(NK,L,M1)+BETA2*ZIJPI(NK,L)+BETA3*ZIJPI(NK,L,P1)
      QZ1=ALPHA1*RHOKM1
      QZ2=ALPHA2*RHO
      QZ4=QZ1*UJPI(NKM1,L)
      QZ5=QZ2*UJPI(NK,L)
      QZ7=QZ1*VJPI(NKM1,L)
      QZ8=QZ2*VJPI(NK,L)

```

```

06610
06620
06630
06640
06650
06660
06670
06680
06690
06700
06710
06720
06730
06740
06750
06760
06770
06780
06790
06800
06810
06820
06830
06840
06850
06860
06870
06880
06890
06900
06910
06920
06930
06940
06950
06960
06970
06980
06990
07000
07010
07020
07030
07040

DRUE=QZ4+QZ5
DRURE=QZ4*RKMI+QZ5*R
DRURX=(RHG+UJPI(NK,L))*R-RHOJMI*U(NK,L)*RJMI)/DX
DRVE=QZ7+QZ8
DRVRE=QZ7*RKMI+QZ8*R
DRWE=QZ1+WJPI(NKMI,L)+QZ2*WJPI(NK,L)
DRWF=BETA1*RHNLMI*WJPI(NK,LM1)+BETA2*RHO*WJPI(NK,L)
+ BETA3*RHNLPI*WJPI(NK,LP1)
IF (IL.EQ.L.OR.L.EQ.NL).AND.NL.NE.1)
DRWF=RHNLPI*WJPI(NK,LP1)/(FI(LP1)-FI(L))
DROUE = ALPHA1*RHOKMI +ALPHA2*RHO
DROUF = BETA1*RHNLMI +BETA2*RHO +BETA3*PHALPI
DRODX=(RHO-RHOJMI)/DX
DRODX=(UJPI(NK,L)-U(NK,L))/DX
DUDE = ALPHA1+WJPI(NKMI,L)+ALPHA2+WJPI(NK,L)
DUDE = ALPHA1+WJPI(NKMI,L)+ALPHA2+WJPI(NK,L)
DUDE = ALPHA1+WJPI(NKMI,L)+ALPHA2+WJPI(NK,L)
DUDE = ALPHA1+WJPI(NKMI,L)+ALPHA2+WJPI(NK,L)
DUDE = BETA1+WJPI(NK,LM1)+BETA2+WJPI(NK,L)+BETA3+WJPI(NK,LP1)
IF (IL.EQ.L.OR.L.EQ.NL).AND.NL.NE.1)
DUDE=WJPI(NK,LP1)/(FI(LP1)-FI(L))
OBTAIN THE COEFFICIENTS FOR THE SHOCK BOUNDARY
CONDITION EQUATIONS.
CALL SHOK8C (NK,NKMI,UJPI(1,L),VJPI(1,L),WJPI(1,L),PJPI(1,L),
PJPI(1,L),ZJPI(1,L),
ET,A,B,C,F)
OBTAIN THE PARAMETERS AND DERIVATIVES NEEDED IN THE
BODY BOUNDARY CONDITION EQUATIONS.
R=XJPI*SINTC
RKPI=R+ET(2)*ZJPI(2,L)*COSIC
RJPI=XJPI*SINTC
CALL PROP (HJPI(1,L),PJPI(1,L),RHODRP,DRH,
MU,DMH,CON,DCH)
CALL PROP (HJPI(2,L),PJPI(2,L),RHOKPI,DRPKPI,
DRHKPI,MUKPI,DMHKPI,CNKKPI,DCHKPI)
VBJPI=V8(JPI,L)
HBJPI=HB(JPI,L)
RDEI=1./ET(2)-ET(1)
DWDE=(MUKPI-MU)*RDEI
DPDX=(PJPI(1,L)-P(1,L))/DX
DUDE=WJPI(2,L)*RDEI
DZUDE=2.*(DUDE-UJPI(3,L)/(ET(3)-ET(1)))/(ET(2)-ET(3))
DPOE = (PJPI(2,L)-PJPI(1,L))*RDEI
IF (.NOT.L.LMI.) DZUDE= WJPI(2,LP1)*RDEI*RDPI
IF (L.LMI.) DZUDE=

```



```

C      (BETA1*WJPI(2,L,M1)+BETA2*WJPI(2,L)+BETA3*WJPI(2,L,P1))*RDET      07C50
DWOE = WJPI(2,L)*RDET      07C60
DZJDF = BETA1*ZIJPI(1,L,M1)+BETA2*ZIJPI(1,L)+BETA3*ZIJPI(1,L,P1)      07C70
DZVDE = 2.*VJPI(2,L)*RDET      07C80
C      OBTAIN THE COEFFICIENTS FOR THE BODY RCUNCARY      07C90
C      CONDITION EQUATIONS.      07100
      CALL BODYBC (MK,UJPI(1,L),VJPI(1,L),WJPI(1,L),HJPI(1,L),PJPI(1,L),      07110
      ZIJPI(1,L),      07120
      ET,A,B,C,F,V8JPI,H8JPI)      07130
C      CALL THE ROUTINE THAT COMPUTES THE INCREMENTS TO BE      07140
C      ADDED TO THE SOLUTION AT X(J).      07150
      127 CONTINUE      07160
      147 CONTINUE      07170
      IF (ISOLV.EQ.0) GO TO 195      07180
      CALL SOLVEQ (NK,NKM1,NKM1G,6,A,B,C,F,DELU,DELV,DELM,DELP,      07190
      DELZI,DEL,RTSIDE,WORK1,WCRK2,WCRK3,WCRK4)      07200
C      COMPUTE THE SOLUTION AT X(J+1).      07210
      DO 150 K=2,NK      07220
      UJPI(K,L)=UJPI(K,L)+DELU(K)      07230
      VJPI(K,L)=VJPI(K,L)+DELV(K)      07240
      WJPI(K,L)=WJPI(K,L)+DELM(K)      07250
      HJPI(K,L)=HJPI(K,L)+DELP(K)      07260
      IF (HJPI(K,L).LT.C.) ITER=-1      07270
      PJPI(K,L)=PJPI(K,L)+DELP(K)      07280
      ZIJPI(K,L)=ZIJPI(K,L)+DELZI(K)      07290
      150 CONTINUE      07300
      ZIJPI(1,L)=ZIJPI(2,L)      07310
      167 CONTINUE      07320
      UJPI(1,L)=0.      07330
      VJPI(1,L)=V8JPI      07340
      WJPI(1,L)=C.      07350
      HJPI(1,L)=H8JPI      07360
C      THE VARIABLES QZ1-6 WERE COMPUTED IN SUBROUTINE BODYBC      07370
C      AND PASSED THROUGH COMMON QZBODY.      07380
      PJPI(1,L) = PJPI(1,L)+(DELZI(2)*QZ2+DELV(2)*QZ3+DELV(3)*QZ33      07390
      +DELP(2)*QZ4+DELM(2)*QZ42+CZ6)*CZ1      07400
      195 CONTINUE      07410
      200 CONTINUE      07420
      RETURN      07430
      END      07440
SUBROUTINE BODYBC (NK,U,V,W,H,P,ZI,ET,A,B,C,F,V8JPI,H8JPI)      07450
THIS SUBROUTINE MODIFIES THE COEFFICIENTS AT K=2 TO TAKE      07460
INTO ACCOUNT THE BOUNDARY CONDITIONS AT THE BODY (K=1).      07470
THE VALUES OF THE SUBSCRIPTS ON THE PARAMETERS ARE      07480

```

```

C          WITH RESPECT TO K=1.
REAL      MU,ME
REAL      MINF
LOGICAL SUBSON,SUAP1
LEVEL 2,U,V,W,P,H,Z,A,B,C,F
DIMENSION U(NK),V(NK),W(NK),H(NK),P(NK),Z1(NK),ET(NK)
DIMENSION A(6,6,NK),B(6,6,NK),C(6,6,NK),F(6,NK)
COMMON DQ1(17),DPDE,DQ2(43),DQDE,DQ3(7),DQVDE,DQ4(3),
5      DQWDEF,DQ5(9)
COMMON ALP(6),
C      BET(2),EPS2,
C      RKM,R,RKPI,RJPI,RHOKM1,RHO,RHCKPI,CCN,MU,PHI
COMMON SUBSON,SUBP1
COMMON KMI,K,KPI
COMMON /CONST/COSTC,SINTC,REINF,PRINF,ME,RREINF,RPRRE,RREME,GM2,
C      MINF,ALFA,SINALF,CTCA,STSA,STCA,CTSA,PINF,VBAR,SPROP
COMMON /VARY/XJMI,XJ,XJPI,DX,DJMI,JMI,J,JPI
COMMON /QZBODY/ QZ1,QZ2,QZ3,QZ4,QZ5,QZ6
C      ,QZ33,QZ42
QZ7=VBJPI-V(1)
QZ8=HBJPI-H(1)
IF (VBJPI-EQ-0.) GO TO 50
IF V AT THE CONE DOES NOT = 0, USE THE CONTINUITY EQUATION.
C
QZ1=1./(DRP*VBJPI*RJPI)
QZ2=RHOKPI*V(2)*ET(2)*COSTC
QZ3=RHOKPI*RKPI
QZ4=V(2)*RKPI*DRPKPI
QZ5=V(2)*RKPI*DRHKPI
QZ6=RHOKPI*V(2)*RKPI-VBJPI*RJPI*(RHG+DRH*QZ8)
GO TO 75
50 CONTINUE
C
IF V AT THE CONE = 0, USE THE V-MOMENTUM EQUATION.
QZ1=1.
QZ2=0.
QZ3=0.
QZ4=1.
QZ5=0.
QZ6=P(2)-P(1)
QZ1 = (ET(2)-ET(1))/Z1(1)
QZ2 = DPDE -RREINF*(MU/(3.*RJPI)*(DQWDEF-BETA2*DQDE))
QZ3 = -RREINF*8.*MU/3./((ET(2)-ET(1))*ET(2)-ET(1))
QZ33 = 0.
QZ4 = Z1(1)/ET(2)-ET(1)
QZ42 = -RREINF*MU/(3.*RJPI*(Z1(1)*BETA2-DQJCF)/(ET(2)-ET(1)))

```

```

QZ5 = 0.
QZ6 = Z1(1)*DPOF-RREINF*(D2VDE*4.*MU/3.
      +MU/(3.*RJPI))*(Z1(1)*C2WDEF-C2IDE*DWDE))
C
75 CONTINUE
DO 100 I1=1,6
  QZ9=A(I1,5,2)*QZ1
  B(I1,1,2)=B(I1,1,1,2)+A(I1,1,2)+QZ9*QZ2
  B(I1,3,2)=B(I1,3,2)+QZ9*QZ3
  B(I1,5,2)=B(I1,5,2)+QZ9*QZ4
  B(I1,6,2)=B(I1,6,2)+QZ9*QZ5
  B(I1,4,2) = B(I1,4,2)+QZ9*QZ42
  C(I1,3,2) = C(I1,3,2)+QZ9*QZ33
  F(I1,2)=F(I1,2)-QZ9*QZ6-A(I1,3,2)*QZ7-A(I1,6,2)*QZ8
100 CONTINUE
DO 300 I1=1,6
DO 200 I2=1,6
  A(I1,I2,2)=0.
200 CONTINUE
300 CONTINUE
RETURN
END
SUBROUTINE SHORBC (NK,NKMI,U,V,H,H,P,ZI,ET,A,B,C,F)
  THIS SUBROUTINE COMPUTES THE COEFFICIENTS FOR THE
  SHOCK BOUNDARY CONDITION EQUATIONS.
  LEVEL 2:U,V,H,H,P,ZI,A,B,C,F
  REAL MU,ME
  NEAL MINF
  LOGICAL SUBSON,SUBP1
  DIMENSION U(NK),V(NK),W(NK),H(NK),P(NK),ZI(NK),ET(NK)
  DIMENSION A(6,6,NK),B(6,6,NK),C(6,6,NK),F(6,NK)
  COMMON DQ1(20),DRHKM1,DRH,DRHKP1,DRPKM1,DRP,DRPKP1,
  DRUE,DQ2(3),DRURE,DRURX,DQ3(8),DRVE,DRVME,DRVHRE,
  DRVPE,DQ4(3),DRWE,DRWF,DQ5(8),
  DUDE,DUDE,DUDE,DUDE,DUDE,DUDE,
  DMOF,DZIDE,DZIDE,DQ6(13)
  COMMON DHOX ,DRODX ,DIDX ,DVOX ,DWOX ,DROCE ,DROCF
  COMMON ALPHA1,ALPHA2,ALPHA3,GAMMA1,GAMMA2,GAMMA3,
  BETA2,EPS2,
  RXM1,R,R,KP1,RJPI,RHOKM1,RHO,RHCKP1,CCN,MU,PHI
  COMMON SUBSON,SUBP1
  COMMON KM1,K,KP1
  COMMON /CONST/CONSTC,SINTC,REINF,PRINF,ME,RREINF,RPRRE,RREPE,GM2,
  MINF,ALFA,SINALF,CTCA,STSA,STCA,PINF,PBAR,SPROP
  COMMON /VARY/XJMI,XJ,XJPI,DX,DXJMI,JMI,J,JPI

```

```

07930
07940
07950
07960
07970
07980
07990
08000
08010
08020
08030
08040
08050
08060
08070
08080
08090
08100
08110
08120
08130
08140
08150
08160
08170
08180
08190
08200
08210
08220
08230
08240
08250
08260
08270
08280
08290
08300
08310
08320
08330
08340
08350
08360

```

DO 200 I1=1,6	08370
DO 100 I2=1,6	08380
A(I1,I2,NK)=0.	08390
R(I1,I2,NK)=0.	08400
C(I1,I2,NK)=0.	08410
100 CONTINUE	08420
200 CONTINUE	08430
COSPHI=COS(PI)	08440
UINF=CICA-STSA*COSPHI	08450
VINF=- (STCA+CTSA*COSPHI;	08460
WINF=SINALF*SIN(PI)	08470
QZ1=(RKM1*V(NK1))-E*(NK)*(DZIDF*W(NK1)+DZIDC*U(NK1))*RKM1))	08480
QZ2=R*U(NK)*Z1(NK)/DX+ALPHA2*(R*V(NK)-E*(NK)*(DZIDF*W(NK)+DZIDC*U(NK)*R))	08490
QZ3=U(NK)*U(NK)	08500
QZ4=V(NK)*V(NK)	08510
QZ5=W(NK)*W(NK)	08520
QZ6=U(NK)*UINF	08530
QZ7=V(NK)*VINP	08540
QZ8=W(NK)*WINP	08550
QZ9=QZ3+QZ4+QZ5	08560
QZ10=QZ6+QZ7+QZ8	08570
QZ11=QZ9-QZ10	08580
QZ12=UINF-U(NK)	08590
QZ13=VINP-V(NK)	08600
QZ14=WINF-W(NK)	08610
QZ15=(U(NK)*QZ12+V(NK)*QZ13+W(NK)*QZ14)**2	08620
QZ16=PINP-P(NK)	08630
A(1,1,NK)=ALPHA1*COSTC*RHOKM1*E*(NK1)*(V(NK1)-U(NK1))*ET(NK)*CZIDC	08640
A(1,2,NK)=-ALPHA1*RHOKM1*RHOKM1*ET(NK)*DZIDC	08650
A(1,3,NK)=ALPHA1*RHOKM1*RHOKM1	08660
A(1,4,NK)=-ALPHA1*RHOKM1*E*(NK)*DZIDF	08670
A(1,5,NK)=DRPKM1*QZ1	08680
A(1,6,NK)=DRHKM1*QZ1	08690
B(1,1,NK)=E*(NK)*(RHO*COSTC*(U(NK)*Z1(NK)/DX-E*(NK)*ALPHA2*DZIDC)+ALPHA2*V(NK)-DRURE/CX	08700
B(1,2,NK)=RHO*(Z1(NK)/DX-E*(NK)*ALPHA2*DZIDC)	08710
B(1,3,NK)=RHO*ALPHA2	08720
B(1,4,NK)=-ALPHA2*RHO*E*(NK)*DZIDF	08730
B(1,5,NK)=DRP*QZ2	08740
B(1,6,NK)=DRH*QZ2	08750
	08760
	08770
	08780
	08790
	08800

```

F(1,NK)=-DRVRS-ZI(NK)*DRWF+ET(NK)*DZIDF*DRWE
      -ZI(NK)*DRURX +ET(NK)*DZIDX*DRURE
      C
      B(2,1,NK)=QZ13/DX
      B(2,2,NK)=-1.
      B(2,3,NK)=-DZIDX
      F(2,NK)=-QZ12
      B(4,1,NK)=QZ14*ET(NK)*COSTC
      B(4,3,NK)=-DZIDF
      B(4,4,NK)=-R
      F(4,NK)=-QZ13*DZIDF-QZ14*R
      B(5,2,NK)=2.*RHO*U(NK)-(RHO+1.)*UINF
      B(5,3,NK)=2.*RHO*V(NK)-(RHO+1.)*VINP
      B(5,4,NK)=2.*RHO*W(NK)-(RHO+1.)*WINP
      B(5,5,NK)=DRP*QZ11
      B(5,6,NK)=DRH*QZ11
      F(5,NK)=-RHG*QZ11-1.*QZ10
      B(6,2,NK)=ME*U(NK)
      B(6,3,NK)=ME*V(NK)
      B(6,4,NK)=ME*W(NK)
      B(6,5,NK)=1.
      F(6,NK)=-H(NK)-ME*QZ9/2.+HBAR
      B(3,2,NK)=RHO*(U(NK)*(6.*QZ6-4.*QZ9)+2.*(UINF*(QZ4+QZ5)
      +2.*U(NK)*(CZ7+QZ8)))
      C
      B(3,3,NK)=RHC*(V(NK)*(6.*QZ7-4.*QZ9)+2.*(VINP*(CZ3+QZ5)
      +2.*V(NK)*(CZ6+QZ8)))
      C
      B(3,4,NK)=RHO*(W(NK)*(6.*QZ8-4.*QZ9)+2.*(WINP*(CZ3+QZ4)
      +2.*W(NK)*(CZ6+QZ7)))
      C
      B(3,5,NK)=-2.*(WINP*(1.-RHO)*QZ10-1.)*QZ16*QZ14)
      B(3,6,NK)=-DRP*QZ15-QZ9-1.*2.*QZ10
      B(3,6,NK)=-DRH*QZ15
      F(3,NK)=RHO*QZ15-(UINF*QZ12+VINP*QZ13+WINP*QZ14)*2
      -QZ16*(QZ12*QZ12+QZ13*QZ13+QZ14*QZ14)
      C
      F(2,NK)=F(2,NK)-QZ13*DZIDX
      B(1,1,NK)=B(1,1,NK)-ET(NK)*DRWE*BETA2
      B(1,4,NK)=B(1,4,NK)+ZI(NK)*RHO*RETA2
      B(1,5,NK)=B(1,5,NK)+DRP*ZI(NK)*W(NK)*BETA2
      B(1,6,NK)=B(1,6,NK)+DRH*ZI(NK)*W(NK)*BETA2
      B(4,1,NK)=B(4,1,NK)+QZ13*BETA2
      RETURN
      END
      SUBROUTINE SETUPE (NK,NKMI,U,V,W,H,P,ZI,ET,A,B,C,F)
      THIS SUBROUTINE SETS UP THE COEFFICIENT MATRIX FOR THE
      C

```

.18950E-02	.98484E+00	.56451E-01	.38406E-02	.26277E-01	.14174E+01
.20624E-02	.98721E+00	.55020E-01	.47644E-02	.23814E-01	.12928E+01
.22299E-02	.98813E+00	.54906E-01	.65181E-02	.23321E-01	.12979E+01
.23969E-02	.98729E+00	.55064E-01	.84711E-02	.22070E-01	.12843E+01
.25639E-02	.98775E+00	.55828E-01	.10628E-01	.22421E-01	.12687E+01
.27309E-02	.98819E+00	.56827E-01	.12898E-01	.21979E-01	.12549E+01
.28980E-02	.98865E+00	.57889E-01	.15166E-01	.21551E-01	.12489E+01
.30650E-02	.98899E+00	.59304E-01	.17490E-01	.21116E-01	.12286E+01
.32320E-02	.98928E+00	.61092E-01	.19838E-01	.20713E-01	.12082E+01
.33991E-02	.98954E+00	.62539E-01	.22100E-01	.20296E-01	.12059E+01
.35661E-02	.98974E+00	.64821E-01	.24136E-01	.19935E-01	.11966E+01
.37331E-02	.98989E+00	.68372E-01	.29934E-01	.19628E-01	.11889E+01
.39001E-02	.99002E+00	.68207E-01	.27575E-01	.19355E-01	.11813E+01
.40671E-02	.99014E+00	.69688E-01	.29926E-01	.19088E-01	.11747E+01
.42341E-02	.99029E+00	.70980E-01	.30338E-01	.18863E-01	.11688E+01
.44011E-02	.99037E+00	.72058E-01	.31520E-01	.18646E-01	.11628E+01
.45681E-02	.99049E+00	.72945E-01	.32548E-01	.18461E-01	.11574E+01
.47351E-02	.99062E+00	.73722E-01	.33413E-01	.18289E-01	.11524E+01
.49021E-02	.99073E+00	.74450E-01	.34113E-01	.18169E-01	.11481E+01
.50691E-02	.99086E+00	.7493E-01	.34536E-01	.18127E-01	.11448E+01
.52361E-02	.99092E+00	.74918E-01	.34995E-01	.18028E-01	.11418E+01
.54031E-02	.99234E+00	.67481E-01	.35211E-01	.16555E-01	.11213E+01
.55701E-02	.0.	.0.	.0.	.25270E-01	.55093E+01
.57371E-02	.12597E-01	.14380E-04	.22789E-18	.29288E-01	.99747E+01
.59041E-02	.26295E-01	.64953E-04	.47625E-16	.25380E-01	.56411E+01
.60711E-02	.41061E-01	.15531E-03	.74683E-16	.25387E-01	.57894E+01
.62381E-02	.57189E-01	.29819E-03	.10389E-15	.28324E-01	.57788E+01
.64051E-02	.74865E-01	.50605E-03	.13636E-15	.25320E-01	.58698E+01
.65721E-02	.94109E-01	.78983E-03	.17191E-15	.25350E-01	.59201E+01
.67391E-02	.11983E+00	.11992E-02	.21096E-15	.29398E-01	.59879E+01
.69061E-02	.12612E+00	.13868E-02	.23176E-15	.25358E-01	.60214E+01
.70731E-02	.13732E+00	.16295E-02	.25297E-15	.25362E-01	.60533E+01
.72401E-02	.14937E+00	.19518E-02	.27538E-15	.25371E-01	.60834E+01
.74071E-02	.16174E+00	.22192E-02	.29986E-15	.25374E-01	.61116E+01
.75741E-02	.18833E+00	.29466E-02	.35204E-15	.25395E-01	.61534E+01
.77411E-02	.21729E+00	.38802E-02	.41889E-15	.29392E-01	.62076E+01
.79081E-02	.24879E+00	.49038E-02	.47711E-15	.25411E-01	.62338E+01
.80751E-02	.28182E+00	.61766E-02	.55341E-15	.25401E-01	.62429E+01
.82421E-02	.32014E+00	.78808E-02	.84233E-15	.29413E-01	.62768E+01
.84091E-02	.36831E+00	.93825E-02	.74793E-15	.25394E-01	.61800E+01
.85761E-02	.40646E+00	.11507E-01	.88901E-15	.25394E-01	.61847E+01
.87431E-02	.49834E+00	.13849E-01	.18888E-14	.29397E-01	.59724E+01
.89101E-02	.51854E+00	.16734E-01	.12896E-14	.25337E-01	.57790E+01

QZ15=QZ12*RHOKP1*RKPI	09690
QZ16=-QZ12*ET(K)*RHOKP1*DZIDF	09700
QZ17=QZ12*(VI(K)*RKPI-ET(K)*(DZIDF*W(KPL)+CZIDF*U(KPL)*RKPI))	09710
CZ18=R*ET(K)*DZIDF*ET(K)*DZIDF	09720
QZ19=DZIDF*DMDF	09730
QZ20=DZIDF*DUDEF	09740
QZ21=2.*ET(K)*MU*DZIDF*(DZIDF-ZI(K)/DF)	09750
-ZI(K)*ET(K)*(MU*DZIDF+CZ19)	09760
QZ22=QZ21+ZI(K)*MU*R*COSTC	09770
QZ23=R*ZI(K)*(ZI(K)*(R*U(K)*V(K)/DX-W(K)*W(K)*CCSTC)+CZ10A*V(K))	09780
QZ24=QZ18+R*R/3.	09790
QZ25=R	09800
QZ26=ZI(K)*(VI(K)*COSTC+U(K)*(SINTC+R/DX))	09810
QZ27=R*ZI(K)*(QZ26+QZ10A)*W(K)	09820
QZ28=R*R+4.*ET(K)*DZIDF*ET(K)*DZIDF/3.	09830
QZ29=ET(K)*ZI(K)*COSTC-R/3.	09840
QZ30=(MU/DF-2.*DMDF)/3.	09850
QZ31=QZ21-ET(K)*DZIDF*ZI(K)*(MU/DF+DMDF)/3.	09860
QZ32=DMDF*QZ28-ET(K)*DZIDF*(4.*DMDF*ZI(K)+R*CVDF)/3.+R*ZI(K)*DMDF	09870
QZ33=ALPHA1*(RKPI*V(KM1)-ET(K)*(DZIDF*W(KM1)+RKPI*U(KM1)*CZIDF))	09880
QZ34=ALPHA2*(R*V(K)-ET(K)*(DZIDF*W(K)+R*U(K)*CZIDF))	09890
+R*U(K)*ZI(K)/DX	09900
QZ35=ALPHA3*(RKPI*V(KPI)-ET(K)*(DZIDF*W(KPI)+RKPI*U(KPI)*CZIDF))	09910
QZ36=R*ZI(K)*R*L(K)*(ZI(K)/DX-ALPHA2*ET(K)*CZIDF)	09920
+ALPHA2*(V(K)*R-ET(K)*DZIDF*W(K))	09930
QZ37=2.*MU*(QZ18*DUDE-ZI(K)*ET(K)*DZIDF*DUDEF)	09940
QZ38=2.*MU*(QZ28*DUDE-ZI(K)*ET(K)*DZIDF*DUDEF*4./3.)	09950
QZ39=DUDE*DUDE+DMDF*DMDF	09960
QZ40=DUDE*DUDE+DMDF*DMDF*4./3.	09970
QZ41=ET(K)*DZIDF*(DUDE*DUDE+DMDF*DMDF*4./3.)	09980
QZ42=QZ18*QZ39+ZI(K)*(ZI(K)*QZ40-2.*QZ41)	09990
+((ET(K)*DZIDF*DMDF)*2)/3.	10000
C	10010
THE SHOCK EQUATION	10020
A(1,1,K)=ALPHA1	10030
A(1,2,K)=0.	10040
A(1,3,K)=0.	10050
A(1,4,K)=0.	10060
A(1,5,K)=0.	10070
A(1,6,K)=0.	10080
B(1,1,K)=ALPHA2	10090
B(1,2,K)=0.	10100
B(1,3,K)=0.	10110
B(1,4,K)=0.	10120
B(1,5,K)=0.	

B(1,6,K)=C.	10130
C(1,1,K)=ALPHA3	10140
C(1,2,K)=0.	10150
C(1,3,K)=0.	10160
C(1,4,K)=0.	10170
C(1,5,K)=0.	10180
C(1,6,K)=0.	10190
F(1,K)=0.	10200
C	
THE U-MOMENTUM EQUATION	
A(2,1,K)=QZ1*U(KP1)	10210
A(2,2,K)=QZ0*RHOKM1*(V(KM1)*RKML-ET(K)*W(KM1)*CZ10F)+QZ2*2.*U(KM1)	10220
A(2,3,K)=QZ3*U(KM1)	10230
A(2,4,K)=QZ4*U(KM1)	10240
A(2,5,K)=QZ5*(U(KM1)*ORPKM1-QZ0*R*DZ1DX*ET(K)	10250
A(2,6,K)=QZ5*U(KM1)*DRHKM1	10260
B(2,1,K)	10270
=ET(K)*Z1(K)*CCSTC*(R*RHOU(K)*U(K)*Z1(K)/DX+ALPHA2*V(K))	10280
+QZ6*(DRUVE-ET(K)*QZ1DF*DRUVE+2.*R*Z1(K)*CPCX)	10290
+QZ7*Z1(K)*(DRUVE-RHO*(K)*W(K)*SINTC+DRUURX)	10300
-R*ET(K)*CPDE*(DZ1DX*(R+2.*ET(K)*Z1(K)*CCSTC)+Z1(K)*R/DX)	10310
-ET(K)*DRUURE*(DZ1DX*QZ6+R*Z1(K)/DX)	10320
-QZ8*ET(K)*QZ1DX*RHOU(K)*U(K)*CCSTC	10330
-QZ8*ET(K)*QZ1DX*RHOU(K)*U(K)*ET(K)*CCSTC	10340
B(2,2,K)=QZ10*2.*U(K)*QZ8*RHOU*(V(K)*R-ET(K)*W(K)*DZ10F)	10350
B(2,3,K)=QZ8*RHO*U(K)	10360
B(2,4,K)=QZ9*(ALPHA2*ET(K)*U(K)*QZ10F+2.*Z1(K)*W(K)*SINTC)	10370
B(2,5,K)=DRP*QZ11+R*Z1(K)*S11(K)/DX-ALPHA2*ET(K)*CZ1CX	10380
C	
IF DP/DX IS EVALUATED EXPLICITLY OR SET TO ZERO REDEFINE QZ5K	
IF (SUBP1)	10390
QZ(2,5,K)=DRP*QZ11+R*Z1(K)*0.	10400
B(2,6,K)=DRH+QZ11	10410
C(2,1,K)=QZ13*U(KP1)	10420
C(2,2,K)=QZ12*RHOKP1*(V(KP1)*RKPL-ET(K)*W(KP1)*CZ1CF)	10430
+QZ14*2.*U(KP1)	10440
C(2,3,K)=QZ15*U(KP1)	10450
C(2,4,K)=QZ16*U(KP1)	10460
C(2,5,K)=QZ17*U(KP1)*DRPKP1-QZ12*R*DZ1DX*ET(K)	10470
C(2,6,K)=QZ17*U(KP1)*DRHKP1	10480
F(2,K)=(-Z1(K)*SINTC*QZ9*W(K)*W(K)	10490
+Z1(K)*QZ25*(DRUVE-ET(K)*QZ1DF*DRUVE+Z1(K)*CRUUF)	10500
F(2,K)=F(2,K)-R*Z1(K)*Z1(K)*(DRUURX+R*QPDX)	10510
-ET(K)*DZ1DX*(DRUURE+R*CPDE)	10520
C	
NOW THE VISCOUS TERMS	
A(2,2,K)=A(2,2,K)-((MU*GAMMA1+ALPHA1*DMDE)*CZ18+ALPHA1*QZ22)/REINF	10540
A(2,6,K)=A(2,6,K)-ALPHA1*DMHKM1*(DUDE*QZ18-ET(K)*Z1(K)*QZ20)/REINF	10550
	10560


```

B(2,1,K)=B(2,1,K)-(COSTC*(DUDE*(MU*Z1(K)*ET(K)*COSTC
+R*(MU*2.*ET(K)*DMCE))
+2.*E1(K)*MU*R*DZUDE)
E
-ET(K)*DZ1DF*(DUDE*DMDF+DMDF*DUDE)
E
-ET(K)*MU*(DZ1DF*DUDE+2.*DZ1DF*DZUDE)
E
+2.*Z1(K)*(MU*DZUDE+DUDE*DMDF))/REINF
E
B(2,2,K)=B(2,2,K)-((MU*GAMMA2+ALPHA2*DMDE)*CZ18+ALPHA2*CZ22)/REINF
B(2,6,K)=B(2,6,K)-DMH*((ALPHA2*DUDE+DZUDE)*CZ18
-ALPHA2*E1(K)*71(K)*CZ20
+DUDE*(R*Z1(K)*COSTC+ET(K)*(2.*DZ1DF*CZ1DF
-Z1(K)*CZ21CF))
E
+Z1(K)*Z1(K)*DZUDE-2.*ET(K)*Z1(K)*CZ1CF*DZUDE)
E
/REINF
E
C(2,2,K)=C(2,2,K)-((MU*GAMMA3+ALPHA3*DMDE)*CZ18+ALPHA3*CZ22)/REINF
C(2,6,K)=C(2,6,K)-ALPHA3*DMH*KP1*(DUDE*CZ19-ET(K)*Z1(K)*CZ20)/REINF
F(2,K)=F(2,K)+((DMDE*DUDE+MU*DZUDE)*CZ18
+MU*Z1(K)*COSTC*DUDE*R
-ET(K)*Z1(K)*DZ1DF*(DMDF*DUDE+DUDE*DMCE)
+2.*ET(K)*DZ1DF*DUDE*(DZ1DF*DUDE-Z1(K)*CZ2UCF
-CDULM1/CF))
E
+Z1(K)*Z1(K)*(DUDE*DMDF+MU*DZUDE)
E
-ET(K)*Z1(K)*MU*DZ1DF*DUDE)/REINF
E
THE V-MOMENTUM EQUATION
A(3,1,K)=QZ1*V(KM1)
A(3,2,K)=QZ2*V(KM1)
A(3,3,K)=QZC*RHOKM1*(2.*V(KM1)*RKM1-ET(K)*W(KM1)*CZ1DF)+QZ2*U(KM1)
A(3,4,K)=QZ4*V(KM1)
A(3,5,K)=QZ5*V(KM1)*DRPKM1+R*QZ0
A(3,6,K)=QZ5*V(KM1)*DRHKM1
B(3,1,K)
E
=ET(K)*Z1(K)*COSTC*(R*RHQ*V(K)*U(K)*Z1(K)/DX+ALPHA2*V(K))
E
+QZ6*(DRVRE-ET(K)*DZ1DF*DRWVE-ET(K)*DZ1DX*DRVRE)
E
+QZ7*Z1(K)*(DRWVE-RHO*W(K)*W(K)*COSTC+DRVRE)
E
+R*OPNE*(R+2.*ET(K)*Z1(K)*COSTC)
E
-R*ET(K)*Z1(K)*DRVRE/DX+DZ1DX*ALPHA2*RHQ*U(K)*V(K)*ET(K)
E
*COSTC)
E
B(3,2,K)=QZ9*V(K)*R*(Z1(K)/DX-ET(K)*ALPHA2*DZ1DX)
B(2,3,K)=CZ10*U(K)+CZ8*RHQ*(2.*V(K)*R-ET(K)*V(K)*CZ1DF)
R(3,4,K)=-QZ9*(ALPHA2*ET(K)*V(K)*DZ1DF+2.*Z1(K)*W(K)*COSTC)
B(3,5,K)=DRP*QZ23+R*QZ8
B(3,6,K)=DRH*QZ23
C(3,1,K)=QZ13*V(KP1)
C(3,2,K)=QZ14*V(KP1)
C(3,3,K)=QZ12*RHOKP1*(2.*V(KP1)*RKP1-ET(K)*W(KP1)*CZ1DF)

```

```

10570
10580
10590
10600
10610
10620
10630
10640
10650
10660
10670
10680
10690
10700
10710
10720
10730
10740
10750
10760
10770
10780
10790
10800
10810
10820
10830
10840
10850
10860
10870
10880
10890
10900
10910
10920
10930
10940
10950
10960
10970
10980
10990
11000

```

6	+QZ14*U(KP1)	11010
6	C(3,4,K)=QZ16*V(KP1)	11020
6	C(3,5,K)=QZ17*V(KP1)*CFPXPI+P*QZ12	11030
6	C(3,6,K)=QZ17*V(KP1)*DRHKPI	11040
6	F(3,K)=-[P*QZ11(K)*DPCE	11050
6	+Z11(K)*QZ25*(DRVRE-ET(K)*DZ1CF*DRWVE	11060
6	+Z1(K)*(DMWVF-QHO*W(K)*W(K)*CCSTC))	11070
6	F(3,K)=F(3,K)-R*Z1(K)*Z1(K)*DRUVRX-ET(K)*DZ1CX*DRUVRE)	11080
6	QW THE VISCOUS TERMS	11090
6	A(3,3,K)=A(3,3,K)-[(MU*GAMMA1+ALPHA1*DMDF)*CZ24+ALPHA1*QZ21]/REINF	11100
6	A(3,4,K)=A(3,4,K)-[(2.*Z1(K)*ET(K)*CCSTC+R)*MU*DZ1CF*ALPHA1/3.	11110
6	-[(MU*GAMMA1+ALPHA1*DMDF)*R*ET(K)*DZ1CF/3.	11120
6	+[(MU/DF*3.)*DMDF)*QZU]/REINF	11130
6	A(3,6,K)=A(3,6,K)-ALPHA1*DMHKPI*(DVDE*QZ24-ET(K)*Z1(K)*CZ1CF*DVOF	11140
6	-R*(Z1(K)*DMDF*2.+ET(K)*CZ1CF*DMCE)/3.)	11150
6	/REINF	11160
6	B(3,1,K)=B(3,1,K)-(R*ET(K)*CCSTC*8./3.*(DMDF*DVDE+MU*DZVDE)	11170
6	-ET(K)*DZ1CF*(DVOF*DMDF+OVDE*DMCF)	11180
6	-ET(K)*MU*(DZ1CF*DVDE+2.*DZ1CF*DZVDEF)	11190
6	+2.*Z1(K)*(MU*DZVDF+DVDF*DMDF)	11200
6	-DZ1CF*ET(K)*CCSTC*(DMDF*(ET(K)*DMDF/3.+MU)	11210
6	+ET(K)*MU*DZVDE/3.)	11220
6	+MU*Z1(K)*CCSTC*DMDF*4./3.	11230
6	+QZ6*(DMDF*DMDF+MU*DZVDEF/3.-DMDF*DMDF*2./3.)/REINF	11240
6	B(3,3,K)=B(3,3,K)-[(MU*GAMMA2+ALPHA2*DMDF)*CZ24+ALPHA2*QZ21]/REINF	11250
6	B(3,4,K)=B(3,4,K)-[(ALPHA2*(R*Z1(K)*(DMDF+MU/DF*3.))	11260
6	-DZ1CF*(MU+ET(K)*DMDF)/3.)	11270
6	-ET(K)*Z1(K)*CCSTC*DZ1CF*MU*2./3.)	11280
6	-GAMMA2*R*ET(K)*DZ1CF*MU/3.)/REINF	11290
6	S(3,6,K)=B(3,6,K)-DMH*((ALPHA2*DVDE+DZVDE)*CZ24	11300
6	-ALPHA2*ET(K)*Z1(K)*DZ1CF*DVOF	11310
6	+DVOF*ET(K)*2.*DZ1CF*DZ1CF-Z1(K)*CZ1CF)	11320
6	+Z1(K)*Z1(K)*DZVDF-2.*ET(K)*Z1(K)*CZ1CF*DZVDEF	11330
6	-DMDF*DZ1CF*(2.*ET(K)*Z1(K)*CCSTC	11340
6	+R*1.+ET(K)*ALPHA2)/3.	11350
6	+R*(DZVDEF*Z1(K)-DZVDE*ET(K)*CZ1CF)/3.	11360
6	-DMDF*Z1(K)*(R*ALPHA2-Z1(K)*CCSTC)*2./3.)/REINF	11370
6	C(3,3,K)=C(3,3,K)-[(MU*GAMMA3+ALPHA3*DMDF)*CZ24+ALPHA3*QZ21]/REINF	11380
6	C(3,4,K)=C(3,4,K)-[(2.*Z1(K)*ET(K)*CCSTC+R)*MU*DZ1CF*ALPHA3/3.	11390
6	-(MU*GAMMA3+ALPHA3*DMDF)*R*ET(K)*DZ1CF/3.	11400
6	+[(MU/DF*3.)*DMDF)*QZ12]/REINF	11410
6	C(3,6,K)=C(3,6,K)-ALPHA3*DMHKPI*(DVDE*QZ24-ET(K)*Z1(K)*CZ1CF*DVOF	11420
6	-Q*(Z1(K)*DMDF*2.+ET(K)*CZ1CF*DMCE)/3.)	11430
6	/REINF	11440

```

F(3,K)=F(3,K)+(DMDF*DVDE+MU*Q2VDE)*QZ24
      + R *(Z1(K)*(DMDF*DMDE+(MU*Q2VDE)-2.*CMDF*CMDE)/3.)
      -QZ1DF*(MU*DMDE+ET(K)*(DMDF*DMDE+MU*Q2VDE))/3.)
      +Z1(K)*Z1(K)*(DMDF*DVDF+MU*Q2VDF+MU*CCSTC*CMDF*2./3.)
      +ET(K)*QZ1DF*(Z1(K)*(2.*MU*(DMVLM1/DF-C2VDEF)
      -DMDF*DVDE-CVDF*DMCE)
      +MU*2.*(QZ1DF*DVDE-Z1(K)*CCSTC*CMDE/3.))
      -MU*Z1(K)*(ET(K)*QZ1DF*DVDE+R*Q2VLM1/(3.*CF)))/REINF
      C
      THE W-MOMENTUM EQUATION
      A(4,1,K)=QZ1*W(KM1)
      A(4,2,K)=QZ2*W(KM1)
      A(4,3,K)=QZ3*W(KM1)
      A(4,4,K)=QZC*RHOKM1*(V(KM1)*RKMI-2.*ET(K)*W(KM1)*QZ1DF)+QZ2*U(KM1)
      A(4,5,K)=QZ5*W(KM1)*DRPKMI-QZ0*ET(K)*QZ1DF
      A(4,6,K)=QZ5*W(KM1)*DRHKMI
      B(4,1,K)=R*ET(K)*Z1(K)*(W(K)*COSTC*(Z1(K)*U(K)/CX
      +ALPHA2*(V(K)-U(K))*ET(K)*CZ1DX))
      -OR(UWRX/DX)
      +QZ6*(DRVWRE-ET(K)*QZ1DF*(DRWWE+DPDE)+QZ1DX*CRUWRE))
      +QZ7*Z1(K)*(RHO*W(K)*(U(K)*SINTC+V(K)*COSTC)+CRWWF+DPDF
      +DRUWRX)
      B(4,2,K)=QZ10*W(K)+QZ9*Z1(K)*W(K)*SINTC
      B(4,3,K)=QZ9*W(K)*(ALPHA2+Z1(K)*COSTC)
      B(4,4,K)=QZ9*(ALPHA2*(V(K)*R-ET(K)*(U(K)*R*QZ1DX+2.*W(K)*CZ1DF))
      +QZ26)
      B(4,5,K)=DRP*QZ27-ET(K)*QZ1DF*QZ8
      B(4,6,K)=DRH*QZ27
      C(4,1,K)=QZ13*W(KP1)
      C(4,2,K)=QZ14*W(KP1)
      C(4,3,K)=QZ15*W(KP1)
      C(4,4,K)=QZ12*RHOKP1*(V(KP1)*RKPI-2.*ET(K)*W(KP1)*CZ1DF)
      +QZ14*U(KP1)
      C(4,5,K)=QZ17*W(KP1)*DRPKPI-QZ12*ET(K)*QZ1DF
      C(4,6,K)=QZ17*W(KP1)*DRHKPI
      F(4,K)= -R*Z1(K)*(DRVWRE+Z1(K)*(DRWWF+DPDF+RHC*W(K)*(U(K)*SINTC
      +V(K)*COSTC))
      -ET(K)*QZ1DF*(DPDE+DRWWE))
      F(4,K)=F(4,K)-R*Z1(K)*(Z1(K)*DRUWRX-ET(K)*QZ1DX*CRUWRE)
      NOW THE VISCOUS TERMS
      A(4,3,K)=A(4,3,K)-(CZ1DF*(QZ29*ALPHA1*MU
      -R*ET(K)*(GAMMA1*MU+ALPHA1*CMCE)/3.))
      +QZ0*QZ30/REINF
      A(4,4,K)=A(4,4,K)-((MU*GAMMA1+ALPHA1*DMDE)*CZ28+ALPHA1*QZ21*4./3.))
      /REINF

```

A(4,6,K)=A(4,6,K)-ALPHA1*DMH*QZ32/REINF	11890
B(4,1,K)=B(4,1,K)-(QZ6*(DMDE*DVDF+MU*QZVDF/3.)-R*DVCE*CMCF*2./3.	11900
-ET(K)*COSTC*(DVDE*(DZ1DF*(ET(K)*CMCE-2.*MU)	11910
+2.*Z1(K)*DMDF)/3.	11920
-MU*(2.*R*QZVDF-ET(K)*CZ1DF*QZVCE/3.)	11930
-2.*R*DMDE*DMDE)	11940
-ET(K)*DMDE*(MU*QZ1DF+DMDF*QZ1DF)*4./3.	11950
+Z1(K)*(DMDF*DMDF+MU*QZVDF)*8./3.-2.*MU*LVDF*CMCF	11960
-ET(K)*QZ1DF*(QZVDF*2.*MU+CMCF*DMDE)*4./3./REINF	11970
B(4,3,K)=B(4,3,K)-(QZ1DF*(QZVDF+ALPHA2*MU	11980
-R*ET(K)*(GAMMA2*MU+ALPHA2*DMDE)/3.)	11990
+QZ8*QZ30)/REINF	12000
B(4,4,K)=B(4,4,K)-((MU*GAMMA2+ALPHA2*DMDE)*QZ28+ALPHA2*QZ21*4./3.)	12010
/REINF	12020
B(4,6,K)=B(4,6,K)-(ALPHA2*DMH*QZ32	12030
+DMH*(Z1(K)*COSTC*(ET(K)*QZ1DF+QVDF-Z1(K)*QVDF)	12040
+R*(Z1(K)*QZVDF-QZ1DF*(QVDF+ET(K)*QZVCE))/3.	12050
+QZVDF*QZ28+Z1(K)*Z1(K)*QZVDF*4./3.	12060
+ET(K)*DMDE*(2.*QZ1DF+QZ1DF-Z1(K)*QZ1DF)	12070
-2.*Z1(K)*QZ1DF+QZ1DF)*4./3./REINF	12080
C(4,3,K)=C(4,3,K)-(QZ1DF*(QZVDF+ALPHA3*MU	12090
-R*ET(K)*(GAMMA3*MU+ALPHA3*DMDE)/3.)	12100
+QZ12*QZ30)/REINF	12110
C(4,4,K)=C(4,4,K)-((MU*GAMMA3+ALPHA3*DMDE)*QZ28+ALPHA3*QZ21*4./3.)	12120
/REINF	12130
C(4,6,K)=C(4,6,K)-ALPHA3*DMH*QZ32/REINF	12140
F(4,K)=F(4,K)+R*(DMDE*(Z1(K)*QVDF-ET(K)*QZ1DF+QVDF/3.)	12150
+MU*(Z1(K)*QZVDF-QZ1DF*(QVDF+ET(K)*QZVCE))/3.	12160
-Z1(K)*DMDF*QVDF*2./3.)	12170
+QZ28*(DMDE*DMDE+MU*QZVDF)	12180
+Z1(K)*Z1(K)*QVDF*DMDF*4./3.	12190
+ET(K)*QZ1DF*QZ1DF*MU*DMDE*8./3.	12200
+Z1(K)*(MU*(COSTC*(ET(K)*QZ1DF+QVDF-Z1(K)*QVDF)	12210
+4.*Z1(K)*QZVDF-ET(K)*QZ1DF+QVDF)	12220
-R*QZVDF/3.)	12230
-ET(K)*QZ1DF*(QVDF+DMDE+QVDF*DMDE	12240
+2.*MU*(QZVDF-QZVDF/3.)	12250
/REINF	12260
C THE CONTINUITY EQUATION	
A(5,1,K)=ALPHA1*COSTC*RHOKM1*ET(KM1)*(V(KM1)-U(KM1)*ET(K)*QZ1DX)	12270
A(5,2,K)=-ALPHA1*ET(K)*QZ1DX*RHOKM1*RKMI	12280
A(5,3,K)=ALPHA1*RHOKM1*RKMI	12290
A(5,4,K)=-ALPHA1*ET(K)*QZ1DF*RHOKM1	12300
A(5,5,K)=DRPKM1*QZ33	12310
	12320

```

A(5,6,K)=DRHKK1*QZ33
B(5,1,K)=ET(K)*(RHO*COSTC*(U(K)*(Z1(K)/DX-ALPHA2*ET(K)*CZ1DX)
      +ALPHA2*V(K))-DRURE/DX) +DRWF+DRURX
B(5,2,K)=RHO*R*(Z1(K)/DX-ALPHA2*ET(K)*CZ1DX)
B(5,3,K)=RHO*R*ALPHA2
B(5,4,K)=-RHO*ALPHA2*ET(K)*QZ1OF
B(5,5,K)=DRP*QZ34
B(5,6,K)=DRH*QZ34
C(5,1,K)=ALPHA3*RHOKP1*ET(KP1)*COSTC*(V(KP1)-U(KP1)*ET(K)*CZ1DX)
C(5,2,K)=-ALPHA3*RHOKP1*RKPI*ET(K)*QZ1DX
C(5,3,K)=ALPHA3*RHOKP1*RKPI
C(5,4,K)=-ALPHA3*RHOKP1*ET(K)*QZ1OF
C(5,5,K)=DRPKP1*QZ35
C(5,6,K)=DRHKK1*QZ35
F(5,K)=-DRVRE-Z1(K)*DRWF+ET(K)*QZ1OF*DRWE
      -Z1(K)*DRURX + ET(K)*QZ1DX*DRURE
      THE ENERGY EQUATION
A(6,1,K)=QZ1*H(KM1)
A(6,2,K)=QZ2*H(KM1)
A(6,3,K)=QZ3*H(KM1)
A(6,4,K)=QZ4*H(KM1)
A(6,5,K)=QZ5*H(KM1)*DRPKM1+QZ0*ME*(ET(K)*(QZ1OF*W(K)+CZ1DX*R*U(K))
      -R*V(K))
A(6,6,K)=QZ5*(H(KM1)*DRHKK1+RHOKM1)
B(6,1,K)=QZ6*(DRVHRE+ET(K)*(QZ1OF*(ME*DPDE*W(K)-DRWHE)
      -QZ1DX*DRUHRF-W(K)*ME*DPDF)
      +QZ7*Z1(K)*(DRUHRX+DRWHE-W(K)*ME*DPDF)
      +12.*Z1(K)*ET(K)*COSTC+R)*ME*DPDE*R*(ET(K)*U(K)*CZ1DX-V(K))
      +R*Z1(K)*ET(K)*((U(K)*(R*ME*DPDE+Z1(K)*RHO*H(K)*COSTC)
      -DRUHRF)/DX
      +ALPHA2*RHO*H(K)*COSTC*(V(K)-U(K)*ET(K)
      *CZ1DX))
B(6,2,K)=R*Z1(K)*(RHO*R*H(K)*(Z1(K)/DX-ET(K)*CZ1DX*ALPHA2)
      +ME*R*(ET(K)*QZ1DX*DPDE-Z1(K)*CPDX))
B(6,3,K)=-R*Z1(K)*(ALPHA2*RHO*H(K)-ME*DPDE)
B(6,4,K)=*Z1(K)*(ET(K)*QZ1OF*(ME*DPDE-ALPHA2*R*H(K))
      -ME*Z1(K)*DPDF)
B(6,5,K)=(H(K)*DRP-ME)*QZ36
      IF OP/DX IS EVALUATED EXPLICITLY OR SET TO ZERC REDEFINE B65K
      IF (SUBP1)
B(6,5,K)=H(K)*DRP*QZ36
      -ME*R*Z1(K)*(R*U(K)*1 0. -ALPHA2*ET(K)*CZ1DX)
      +ALPHA2*(V(K)*R-ET(K)*QZ1OF*W(K))
B(6,6,K)=(H(K)*DRH+RHO)*QZ36

```

.56405E-03	.40593E+00	.10658E-01	.45083E-01	.27932E-01	.61309E+01	.62675E+01
.66430E-03	.45601E+00	.12056E-01	.45553E-01	.27905E-01	.60013E+01	.66917E+01
.75213E-03	.51848E+00	.13391E-01	.47314E-01	.27893E-01	.58104E+01	.91749E+01
.84874E-03	.56935E+00	.14165E-01	.48282E-01	.27866E-01	.55446E+01	.97224E+01
.95416E-03	.63230E+00	.15308E-01	.49304E-01	.27806E-01	.51917E+01	.10335E+02
.10699E-02	.69962E+00	.24919E-01	.53998E-01	.27738E-01	.47321E+01	.11022E+02
.11973E-02	.77871E+00	.29051E-01	.30444E-01	.27646E-01	.41488E+01	.11775E+02
.13374E-02	.84349E+00	.33935E-01	.23966E-01	.27519E-01	.34348E+01	.12163E+02
.14919E-02	.91232E+00	.39510E-01	.17395E-01	.27344E-01	.26181E+01	.13290E+02
.16515E-02	.96237E+00	.44808E-01	.12726E-01	.27203E-01	.18608E+01	.13763E+02
.18116E-02	.98376E+00	.47754E-01	.11763E-01	.26991E-01	.14496E+01	.13868E+02
.19717E-02	.98974E+00	.48398E-01	.14848E-01	.26788E-01	.13348E+01	.13898E+02
.21318E-02	.98468E+00	.48195E-01	.19016E-01	.26829E-01	.13411E+01	.13785E+02
.22916E-02	.98547E+00	.48216E-01	.25462E-01	.25426E-01	.13302E+01	.13799E+02
.24512E-02	.98904E+00	.48891E-01	.31804E-01	.25889E-01	.13132E+01	.13795E+02
.26109E-02	.98504E+00	.49610E-01	.38018E-01	.24601E-01	.13049E+01	.13795E+02
.27705E-02	.98603E+00	.50788E-01	.44399E-01	.24211E-01	.12938E+01	.13796E+02
.29303E-02	.98605E+00	.52881E-01	.50879E-01	.23801E-01	.12828E+01	.13798E+02
.30900E-02	.98605E+00	.53720E-01	.52327E-01	.23461E-01	.12714E+01	.13796E+02
.32496E-02	.98595E+00	.55469E-01	.63573E-01	.23095E-01	.12615E+01	.13796E+02
.33894E-02	.98581E+00	.57248E-01	.69312E-01	.22887E-01	.12531E+01	.13798E+02
.35092E-02	.98565E+00	.58892E-01	.74336E-01	.22532E-01	.12457E+01	.13796E+02
.36209E-02	.98547E+00	.60461E-01	.78822E-01	.22315E-01	.12392E+01	.13796E+02
.37207E-02	.98530E+00	.61895E-01	.82834E-01	.22102E-01	.12334E+01	.13797E+02
.38125E-02	.98512E+00	.63147E-01	.86465E-01	.21936E-01	.12201E+01	.13797E+02
.38964E-02	.98497E+00	.64231E-01	.89739E-01	.21767E-01	.12230E+01	.13797E+02
.39722E-02	.98483E+00	.65191E-01	.92583E-01	.21631E-01	.12186E+01	.13797E+02
.40481E-02	.98474E+00	.65837E-01	.94987E-01	.21521E-01	.12144E+01	.13796E+02
.41016E-02	.98464E+00	.66485E-01	.96917E-01	.21476E-01	.12113E+01	.13795E+02
.41575E-02	.98458E+00	.66488E-01	.98391E-01	.21322E-01	.12077E+01	.13798E+02
.42094E-02	.98447E+00	.67536E-01	.99243E-01	.21153E-01	.12000E+01	.13798E+02
.42573E-02	.98530E+00	.62932E-01	.99882E-01	.20368E-01	.11958E+01	.13008E+02

AT PI = 168.80 CPIN = 7.109E-32 STIN = .24842E-01 SHOCK DISTANCE = .43798E-02

Y	U	V	W	P	M	H TOTAL
0.	0.	0.	0.	.26371E-01	.55093E+01	.55093E+01
.16429E-04	.12572E-01	.14091E-04	.17468E-02	.26368E-01	.55747E+01	.55748E+01
.34493E-04	.26241E-01	.63584E-04	.35756E-02	.26392E-01	.56422E+01	.56512E+01

E	*MU*QZ42*ME/REINF	13210
C	NOW THE VISCOUS DISSIPATION TERMS	
	A(6,2,K)=A(6,2,K)-QZ37*ALPHA1*ME/REINF	13220
	A(6,4,K)=A(6,4,K)-QZ38*ALPHA1*ME/REINF	13230
	B(6,1,K)=B(6,1,K)-2.*MU*(R*ET(K)*CCSTC*QZ39+Z1(K)*QZ40-QZ41)	13240
E	*ME/REINF	13250
	B(6,2,K)=B(6,2,K)-QZ37*ALPHA2*ME/REINF	13260
	B(6,4,K)=B(6,4,K)-QZ38*ALPHA2*ME/REINF	13270
	B(6,6,K)=B(6,6,K)-DMH*QZ42*ME/REINF	13280
	C(6,2,K)=C(6,2,K)-QZ37*ALPHA3*ME/REINF	13290
	C(6,4,K)=C(6,4,K)-QZ38*ALPHA3*ME/REINF	13300
C	ADD IN THE CONTRIBUTIONS FROM THE PHI-DERIVATIVE TERMS.	
	QX1 = ET(K)*((DZ1DF*(2.*ET(K)*DMDE+4.*MU) -Z1(K)*CMCF)*BETA2	13310
E	-EPS2*Z1(K)*MU)*RREINF	13320
	QX2 = R*Z1(K)*Z1(K)*BETA2	13330
	QX3 = Z1(K)*(BETA2*(Z1(K)*DMDF-ET(K)*DZ1DF*(DMDE+2.*MU*ALPHA2))	13340
E	+EPS2*Z1(K)*MU)*RREINF	13350
	QX4 = QX2*W(K)	13360
	QX5 = QX4*RHO	13370
	QX6 = QX4*U(K)	13380
	QX7 = QX4*V(K)	13390
	QX8 = QX4*W(K)	13400
	QX9 = QX4*H(K)	13410
	QX10 = 2.*ET(K)*MU*Z1(K)*DZ1DF*RREINF*BETA2	13420
	QX11 = QX10*ALPHA1	13430
	QX12 = QX10*ALPHA3	13440
	QX13 = R*MU*Z1(K)*RREINF*BETA2	13450
	QX14 = QX13*ALPHA1	13460
	QX15 = QX13*ALPHA3	13470
	QX16 = 2.*ET(K)*CON*Z1(K)*DZ1DF*RRPRE*BETA2	13480
	A(2,2,K) = A(2,2,K) + QX11	13490
	B(2,1,K) = B(2,1,K) - R*Z1(K)*ET(K)*DRWUE*BETA2 -CX1*DUCE	13500
E	+RREINF*BETA2*ET(K)*(Z1(K)*DMCE*CMCF	13510
	+2.*MU*(Z1(K)*DZ1DF-ET(K)*CZICF*CMCE))	13520
E		13530
	B(2,2,K) = B(2,2,K) + QX5 - QX3	13540
	B(2,4,K) = B(2,4,K) + QX2*RHO*U(K)	13550
	B(2,5,K) = B(2,5,K) + ORP*QX6	13560
	B(2,6,K) = B(2,6,K) + ORH*QX6	13570
E	-RREINF*DMH*Z1(K)*BETA2*(Z1(K)*DUDF-ET(K)*CZ1DF*DUCE)	13580
	C(2,2,K) = C(2,2,K) + QX12	13590
	A(3,3,K) = A(3,3,K) + QX11	13600
	A(3,4,K) = A(3,4,K) - QX14/3.	13610
	B(3,1,K) = B(3,1,K) - S*Z1(K)*ET(K)*DRWUE*BETA2 -CX1*CVDE	13620
E	+RREINF*BETA2*(ETINK)*Z1(K)*DMCE*CMCF	13630
		13640

	$+2.*MU*(Z1(K)*D2VDEF-ET(K)*DZICF*C2VCE))$	13650
ξ	$+(DWE*(ET(K)*(R*DME+2.*MU*CCSTC*Z1(K))+R*MU)$	13660
ξ	$+D2WDE*R*MU*ET(K))/3.)$	13670
ξ	$B(3,3,K) = B(3,3,K) + QX5 - QX3$	13680
ξ	$B(3,4,K) = B(3,4,K) + QX2*RHO*V(K) - RREINF*8ETA2*Z1(K)*$	13690
ξ	$(R*MU*ALPHA2-2.*R*DME+2.*MU*Z1(K)*COSTC1/3.$	13700
ξ	$B(3,5,K) = B(3,5,K) + DRP*QX7$	13710
ξ	$B(3,6,K) = B(3,6,K) + DRH*QX7 - RREINF*8ETA2*Z1(K)*CMH*$	13720
ξ	$(Z1(K)*DWF+R*DWE -ET(K)*CZICF*CVC)$	13730
ξ	$C(3,3,K) = C(3,3,K) + QX12$	13740
ξ	$C(3,4,K) = C(3,4,K) - QX15/3.$	13750
ξ	$A(4,3,K) = A(4,3,K) - QX14/3.$	13760
ξ	$A(4,4,K) = A(4,4,K) + QX11*4./3.$	13770
ξ	$B(4,1,K) = B(4,1,K) - R*Z1(K)*ET(K)*8ETA2*(ORHWE+CPCE)$	13780
ξ	$-QX1*DWE*4./3. + RREINF*8ETA2*(DWE*(ET(K)*(R*DME/3.$	13790
ξ	$-MU*CCSTC*Z1(K))+R*MU/3.) + D2VDE*R*MU*ET(K)/3.$	13800
ξ	$+ET(K)*(Z1(K)*(DWE*DWF+2.*MU*D2WDEF)$	13810
ξ	$-2.*MU*ET(K)*DZIDF*D2WDE)*4./3.)$	13820
ξ	$B(4,3,K) = B(4,3,K) - RREINF*8ETA2*Z1(K)*(R*MU*ALPHA2/3.+R*DWE$	13830
ξ	$-MU*Z1(K)*CCSTC)$	13840
ξ	$B(4,4,K) = B(4,4,K) + 2.*QX5 - QX3*4./3.$	13850
ξ	$B(4,5,K) = B(4,5,K) + DRP*QX8 + QX2$	13860
ξ	$B(4,6,K) = B(4,6,K) + DRH*QX8 - RREINF*8ETA2*Z1(K)*CMH*$	13870
ξ	$(4.*Z1(K)*DWF -2.*R*DWE -4.*ET(K)*DZIDF*CWCE1/3.$	13880
ξ	$C(4,3,K) = C(4,3,K) - QX15/3.$	13890
ξ	$C(4,4,K) = C(4,4,K) + QX12*4./3.$	13900
ξ	$B(5,1,K) = B(5,1,K) - ET(K)*DRH*8ETA2$	13910
ξ	$B(5,4,K) = B(5,4,K) + Z1(K)*RHC*8ETA2$	13920
ξ	$B(5,5,K) = B(5,5,K) + DRP*Z1(K)*M(K)*8ETA2$	13930
ξ	$B(5,6,K) = B(5,6,K) + DRH*Z1(K)*M(K)*8ETA2$	13940
ξ	$A(6,6,K) = A(6,6,K) + QX16*ALPHA1$	13950
ξ	$B(6,1,K) = B(6,1,K) - R*Z1(K)*ET(K)*8ETA2*(ORHWE-ME*M(K)*CPCE)$	13960
ξ	$-RPRRE*ET(K)*(1*(DZIDF*(2.*ET(K)*DCE*4.*CCN)$	13970
ξ	$-Z1(K)*DCCF)*8ETA2$	13980
ξ	$--EPS2*Z1(K)*CQ)*DWE$	13990
ξ	$-BETA2*(Z1(K)*DCE*DHF+$	14000
ξ	$2.*CON*(Z1(K)*D2HDEF-ET(K)*DZIDF*D2HCE1))$	14010
ξ	$-RREME*MU*ET(K)*8ETA2*2.*(DWE*(ET(K)*DZIDF*DWE-Z1(K)*CUDF)$	14020
ξ	$+DWE*(ET(K)*DZIDF*DWE-Z1(K)*CUDF)*4./3.)$	14030
ξ	$B(6,2,K) = B(6,2,K) - RREME*2.*MU*Z1(K)*8ETA2*(Z1(K)*CUDF$	14040
ξ	$-ET(K)*CUDF)$	14050
ξ	$B(6,4,K) = B(6,4,K) + QX2*RHO*H(K) - RREME*8./3.*MU*Z1(K)*8ETA2$	14060
ξ	$*(Z1(K)*DWF-ET(K)*CZIDF*DWE)$	14070
ξ	$B(6,5,K) = B(6,5,K) + DRP*QX9 - ME*QX4$	14080


```

R(6,6,K) = B(6,6,K) + DRH*QX9 + QX5 - RPRR*Z1(K)*
      (BETA2*(Z1(K)*(DCDF+DCH*DWDF)-ET(K)*DZIDF*DCCE
      +2.*CCN*ALPHA2+DCH*CHDE))
      14090
      14100
      14110
      14120
      14130
      14140
      14150
      14160
      14170
      14180
      14190
      14200
      14210
      14220
      14230
      14240
      14250
      14260
      14270
      14280
      14290
      14300
      14310
      14320
      14330
      14340
      14350
      14360
      14370
      14380
      14390
      14400
      14410
      14420
      14430
      14440
      14450
      14460
      14470
      14480
      14490
      14500
      14510
      14520

      +EPS2*Z1(K)*CON)
      C(6,6,K) = C(6,6,K) + QX16*ALPHA3
      ADD IN SOME TERMS TO THE ENERGY EQUATION THAT HAD BEEN
      FORGOTTEN.
      QZ43 = 2.*MU*(QZ24*DVDE -ET(K)*DZIDF*(Z1(K)*DVDF+R*CHDE/3.))
      14170
      14180
      14190
      14200
      14210
      14220
      14230
      14240
      14250
      14260
      14270
      14280
      14290
      14300
      14310
      14320
      14330
      14340
      14350
      14360
      14370
      14380
      14390
      14400
      14410
      14420
      14430
      14440
      14450
      14460
      14470
      14480
      14490
      14500
      14510
      14520

      QZ44 = 2.*MU*AR*(Z1(K)*DVDF -ET(K)*DZIDF*DVDE/3.)
      QZ45 = -ET(K)*DZIDF*DVDF*DVDE -K*(DVDE*DWDF*2./3.-CWCE*DVDF)
      QZ46 = QZ24*DVDE*DVDE+Z1(K)*Z1(K)*DVDF*DVDF
      -2.*ET(K)*DZIDF*DVDE*(Z1(K)*DVDF+R*DWDF/3.)
      +2.*R*Z1(K)*(DVDE*DVDF-DVDE*DWDF*2./3.)
      A(6,3,K) = A(6,3,K) -QZ43*ALPHA1*RRRME
      A(6,4,K) = A(6,4,K) -QZ44*ALPHA1*RRRME
      B(6,1,K) = B(6,1,K) -2.*MU*(R*ET(K)*CCSTC*DVDE*DVCE*4./3.
      +Z1(K)*DVDF*DVCE +CZ45
      -ET(K)*CCSTC*(Z1(K)*(DVDE*DWDF*2./3.-CWCE*DVDF)
      -ET(K)*DZIDF*DVDE*DWDF/3.) )*RRRME
      -RRRME*2.*MU*ET(K)*DVDE*BETA2*(ET(K)*DZIDF*DVCE
      -Z1(K)*DVDF-R*DWDF/3.)
      H(6,3,K) = B(6,3,K) -QZ43*ALPHA2*RRRME
      -RRRME*2.*MU*Z1(K)*BETA2*(Z1(K)*DVDF-ET(K)*DZIDF*DVCE
      +R*UNDE)
      B(6,4,K) = B(6,4,K) -QZ44*ALPHA2*RRRME
      +RRRME*MU*R*Z1(K)*DVDE*BETA2*4./3.
      B(6,6,K) = B(6,6,K) -DNR*QZ46*RRRME
      C(6,3,K) = C(6,3,K) -QZ43*ALPHA3*RRRME
      C(6,4,K) = C(6,4,K) -QZ44*ALPHA3*RRRME
      F(6,K) = F(6,K) +MU*QZ46*RRRME
      IF (.NOT.SUBSON) RETURN
      IF DP/DETA IS SET TO ZERO, REDEFINE A FEW COEFFICIENTS.
      70 500 I=1,6
      A(3,1,K) = A(5,1,K)
      B(3,1,K) = B(5,1,K)
      C(3,1,K) = C(5,1,K)
      A(5,1,K) = 0.0
      B(5,1,K) = 0.0
      C(5,1,K) = 0.0
      500 CONTINUE
      A(5,5,K) = 0.
      B(5,5,K) = 1.
      C(5,5,K) = -1.

```

```

F(3,K) = F(5,K)
F(5,K) = P(K+1) - P(K)
RETURN
END
SUBROUTINE BCIC (NJ,NK,NL,U,V,W,H,P,ZI,UJMI,VJMI,WJMI,HJMI,PJMI,
E
    ZIJMI,
    ET,FI,X,VB,H8)
C
C THIS SUBROUTINE READS IN THE MESH DISTRIBUTION FOR X, ET,
C AND FI. THE BOUNDARY CONDITIONS AND THE INITIAL CONDITIONS
C ARE ALSO READ IN.
C TAPE3 IS THE INPUT TAPE WHEN THE INITIAL CONDITIONS ARE READ
C FROM TAPE
C
REAL MU
LEVEL 2,U,UJMI,V,VJMI,W,WJMI,H,HJMI,P,PJMI,ZI,ZIJMI
DIMENSION U(NK,NL),UJMI(NK,NL),V(NK,NL),VJMI(NK,NL),
E
W(NK,NL),WJMI(NK,NL),H(NK,NL),HJMI(NK,NL),
E
P(NK,NL),PJMI(NK,NL),ZI(NK,NL),ZIJMI(NK,NL),
E
ET(NK),FI(NL),X(NJ),VB(NJ,NL),HB(NJ,NL)
COMMON QZ(18),IQZ(3)
C*****IF THE PLANE OF INITIAL CONDITIONS IS TO BE READ FROM TAPE***
C*****THEN THE DIMENSIONS OF U,V,W,H,P MUST BE WHATEVER THEY WERE*****
C*****WHEN THE SOLUTION WAS ORIGINALLY WRITTEN ON THE TAPE.*****
COMMON /OUTDEP/ U,V,W,H,P,ZI(50,20,6)
JJ=C
LL=0
READ (5,1020) IREAD
IF (IREAD.GT.0) GO TO 105
DO 100 L=1,NL
C
C READ IN A VALUE FOR FI AND THE CORRESPONDING VALUE
C FOR ZI. (ZI IS NOT A FUNCTION OF ETA.)
READ (5,1010) FI(L),ZI(L,L)
FI(L)=FI(L)*.0174532925199433
C
C READ IN THE INITIAL VALUES OF THE SOLUTION (THE VALUES AT
C X=X(1)) ALONG A RAY NORMAL TO THE BODY.
READ (5,1010) (ET(K),U(K,L),V(K,L),W(K,L),H(K,L),P(K,L),X=1,NK)
WRITE(6,1010) (ET(K),U(K,L),V(K,L),W(K,L),H(K,L),P(K,L),K=1,NK)
QZ1=1./ZI(L,L)
DO 50 K=1,NK
ET(K)=ET(K)*QZ1
50 CONTINUE
100 CONTINUE
105 CONTINUE
C
C READ IN THE DISTRIBUTION OF X-STATIONS ALONG THE BODY
C AT WHICH THE SOLUTION WILL BE OBTAINED.
NJDR6=NJ

```

14530
14540
14550
14560
14570
14580
14590
14600
14610
14620
14630
14640
14650
14660
14670
14680
14690
14700
14710
14720
14730
14740
14750
14760
14770
14780
14790
14800
14810
14820
14830
14840
14850
14860
14870
14880
14890
14900
14910
14920
14930
14940
14950
14960

```

14970 IF (NJ-GT.6) NJDR=6
14980 READ (5,1010) (X(J),J=1,NJOR6)
14990 IF (NJ.LE.2) GO TO 180
15000 IF (X(2).LT.X(3).AND.NJ.GT.6) READ (5,1010) (X(J),J=7,NJ)
15010 IF ALL OF THE X-STATIONS ARE TO BE READ IN, READ IN THE REST
15020 OF THEM
15030 IF (X(2).LT.X(3)) GO TO 180
15040 DX=X(2)-X(1)
15050 THE REST OF THE X-STATIONS CAN BE GENERATED FROM THE FIRST
15060 ONE. EACH SUCCESSIVE X-STATION IS MADE PROPORTIONAL TO THE
15070 PREVIOUS ONE.
15080 DO 175 J=2,NJ
15090 C*****THE PROPORTIONALITY CONSTANT (THE NUMBER CLOSE TO 1.) ON THE*
15100 C*****NEXT CARD MUST BE CHANGED HERE TO WHATEVER IS NEEDED.*****
15110 IXJ = 1.03 *X(J-1)*1000. + .5
15120 X(J) = IXJ
15130 X(J) = X(J) * .CC1
15140 175 CONTINUE
15150 180 CONTINUE
15160 WRITE (6,1010) X
15170 IF (IREAD.LE.0) GO TO 145
15180 READ IN THE INITIAL PLANE FROM TAPES.
15190 EPS = 1.E-10
15200 READ (3) QZ,IQZ
15210 READ (3) XX,ET,FI,UVMPHZ
15220 IF (X(1)-EPS.LE.XX) GO TO 140
15230 130 CONTINUE
15240 READ (3) XX,ET,FI,UVMPHZ
15250 IF (X(1)-EPS.GT.XX) GO TO 130
15260 140 CONTINUE
15270 DO 122 L=1,NL
15280 DO 122 K=1,NK
15290 U(K,L) = UVMPHZ(K,L,1)
15300 V(K,L) = UVMPHZ(K,L,2)
15310 W(K,L) = UVMPHZ(K,L,3)
15320 P(K,L) = UVMPHZ(K,L,4)
15330 H(K,L) = UVMPHZ(K,L,5)
15340 Z(K,L) = UVMPHZ(K,L,6)
15350 122 CONTINUE
15360 BACKSPACE 3
15370 BACKSPACE 3
15380 READ (3) XX,ET,FI,UVMPHZ
15390 DO 128 L=1,NL
15400 DO 128 K=1,NK

```

```

UJMI(K,L) = UVMPHZ(K,L,1)
VJMI(K,L) = UVMPHZ(K,L,2)
WJMI(K,L) = UVMPHZ(K,L,3)
PJMI(K,L) = UVMPHZ(K,L,4)
HJMI(K,L) = UVMPHZ(K,L,5)
ZJMI(K,L) = UVMPHZ(K,L,6)
128 CONTINUE
145 CONTINUE
      READ IN THE VALUES OF V AND H ALONG THE BCDY AT VARIOUS
      L-J (ETA-X) GRID POINTS. LINEAR INTERPOLATION WILL BE USED
      TO OBTAIN VALUES OF V0 AND H0 WHERE THEY ARE NOT SPECIFIED.
200 CONTINUE
      READ (5,1020) J,V8(J,L),H8(J,L)
250 CONTINUE
      V02=V8(J,L)
      H02=H8(J,L)
      IF (J-JJ-LE,1) GO TO 400
      JM1=J-1
      JJP1=JJ+1
      QZ1=1./((X(J)-X(JJ))
      QZ2=(H02-H81)*QZ1
      QZ1=(V02-V81)*QZ1
      DO 300 I1=JJP1,JM1
      QZ3=X(I1)-X(JJ)
      V8(I1,L)=V81+QZ1*QZ3
      H8(I1,L)=H81+QZ2*QZ3
300 CONTINUE
400 CONTINUE
      V81=V82
      H81=H82
      JJ=J
      IF (J,LY,NJ) GO TO 250
      IF (L-LL-LE,1) GO TO 700
      LM1=L-1
      LLP1=LL+1
      DO 600 I1=1,NJ
      V81=V8(I1,LL)
      H81=H8(I1,LL)
      QZ1=1./((F1(L)-F1(LL))
      QZ2=(H81-F1(L))-H81)*QZ1
      QZ1=(V81-F1(L))-V81)*QZ1
      DO 500 I2=LLP1,LM1
      QZ3=F1(I2)-F1(LL)

```

15410
15420
15430
15440
15450
15460
15470
15480
15490
15500
15510
15520
15530
15540
15550
15560
15570
15580
15590
15600
15610
15620
15630
15640
15650
15660
15670
15680
15690
15700
15710
15720
15730
15740
15750
15760
15770
15780
15790
15800
15810
15820
15830
15840

```

15850 VB(I1,I2)=VB1+QZ1*QZ3
15860 HB(I1,I2)=HB1+QZ1*QZ3
15870
15880
15890
15900
15910
15920
15930
15940
15950
15960
15970
15980
15990
16000
16010
16020
16030
16040
16050
16060
16070
16080
16090
16100
16110
16120
16130
16140
16150
16160
16170
16180
16190
16200
16210
16220
16230
16240
16250
16260
16270
16280

500 CONTINUE
600 CONTINUE
700 CONTINUE
LL=L
IF (LL.LF.NL) GO TO 200
1010 FORMAT (6E12.5)
1020
IF (IRCAD.GT.O) RETURN
C DEFINE THE SOLUTION SO THAT THE X-DERIVATIVES FOR THE
C FIRST X-STEP WILL BE ZERO.
DO 800 I2=1,NL
DO 800 I1=1,NK
UJM(I1,I2)=U(I1,I2)
VJM(I1,I2)=V(I1,I2)
WJM(I1,I2)=W(I1,I2)
HJM(I1,I2)=H(I1,I2)
PJM(I1,I2)=P(I1,I2)
C Z1 IS NOT A FUNCTION OF ETA (I.E. I1).
ZI(I1,I2)=ZI(I1,I2)
ZJM(I1,I2)=ZI(I1,I2)
800 CONTINUE
RETURN
END
SUBROUTINE LEQ(A,B,NEQS,NSOLNS,IA,IR,DET)
C LINEAR EQUATIONS SOLUTIONS FORTRAN II VERSION
C SOLVE A SYSTEM OF LINEAR EQUATIONS OF THE FORM AX=B BY A MODIFIED
C GAUSS ELIMINATION SCHEME
C
C NEQS = NUMBER OF EQUATIONS AND UNKNOWNNS
C NSOLNS = NUMBER OF VECTOR SOLUTIONS DESIRED
C IA = NUMBER OF ROWS OF A AS DEFINED BY DIMENSION STATEMENT ENTRY
C IR = NUMBER OF ROWS OF B AS DEFINED BY DIMENSION STATEMENT ENTRY
C ADET = DETERMINANT OF A, AFTER EXIT FROM LEQ
C
C DIMENSION A(IA,IA),B(IR,IR)
NSIZ = NEQS
NBSIZ = NSOLNS
C START SYSTEM REDUCTION
NUMSYS=NSIZ-1
DO 14 I=1,NUMSYS
NW=I+1
BIG=A(I,I)

```

```

16290 NBRW=1
16300 BG=1.C/RIG
16310 ELIMINATE UNKNOWN FROM FIRST COLUMN OF CURRENT SYSTEM
16320 DO 13 K=NN,NSIZ
16330 C COMPUTE PIVOTAL MULTIPLIER
16340 PMULT=-A(K,I)*GG
16350 C APPLY PMULT TO ALL COLUMNS OF THE CURRENT A-MATRIX ROW
16360 DO 11 J=NN,NSIZ
16370 A(K,J)=PMULT*A(I,J)+A(K,J)
16380 C APPLY PMULT TO ALL COLUMNS OF MATRIX B
16390 DO 12 L=1,NBSIZ
16400 B(K,L)=PMULT*B(I,L)+B(K,L)
16410 C CONTINUE
16420 C CONTINUE
16430 DO BACK SUBSTITUTION
16440 C WITH H-MATRIX COLUMN = NCOLB
16450 DO 15 NCOLB=1,NBSIZ
16460 C DO FOR ROW = NROW
16470 DO 19 I=1,NSIZ
16480 NROW=NSIZ+1-I
16490 TEMP=0.0
16500 C NUMBER OF PREVIOUSLY COMPUTED UNKNOWN = NXS
16510 NXS=NSIZ-NROW
16520 C ARE WE DOING THE BOTTOM ROW
16530 IF(NXS) 16,17,16
16540 C NO
16550 DO 18 K=1,NXS
16560 KK=NSIZ+1-K
16570 TEMP=TEMP+B(K,NCOLB)+A(NROW,KK)
16580 B(NROW,NCOLB)=(B(NROW,NCOLB)-TEMP)/A(NROW,NROW)
16590 C HAVE WE FINISHED ALL ROWS FOR B-MATRIX COLUMN = NCCLB
16600 C CONTINUE
16610 YES
16620 C HAVE WE JUST FINISHED WITH B-MATRIX COLUMN NCCLB=NSIZ
16630 C CONTINUE
16640 YES
16650 C WE ARE ALL DONE NOW
16660 C WHEN...
16670 RETURN
16680 C
16690 C SUBROUTINE MODIFY(NK,NL,NEWNK,NEWNL,ET,FI,FINW,FINW,
16700 U,UNEWE,UNEWEF,V,VNEWE,VNEWEF,M,MNEWE,MNEWEF,
16710 P,PHWE,PNEWEF,H,HNEWE,HNEWEF,
16720 Z,ZINEWE,ZINWEF,

```

```

      16730
      16740
      16750
      16760
      16770
      16780
      16790
      16800
      16810
      16820
      16830
      16840
      16850
      16860
      16870
      16880
      16890
      16900
      16910
      16920
      16930
      16940
      16950
      16960
      16970
      16980
      16990
      17000
      17010
      17020
      17030
      17040
      17050
      17060
      17070
      17080
      17090
      17100
      17110
      17120
      17130
      17140
      17150
      17160

      1
      2
      3
      4
      5
      6
      7
      8
      9
      10
      11
      12
      13
      14
      15
      16
      17
      18
      19
      20
      21
      22
      23
      24
      25
      26
      27
      28
      29
      30
      31
      32
      33
      34
      35
      36
      37
      38
      39
      40
      41
      42
      43
      44
      45
      46
      47
      48
      49
      50
      51
      52
      53
      54
      55
      56
      57
      58
      59
      60
      61
      62
      63
      64
      65
      66
      67
      68
      69
      70
      71
      72
      73
      74
      75
      76
      77
      78
      79
      80
      81
      82
      83
      84
      85
      86
      87
      88
      89
      90
      91
      92
      93
      94
      95
      96
      97
      98
      99
      100
      101
      102
      103
      104
      105
      106
      107
      108
      109
      110
      111
      112
      113
      114
      115
      116
      117
      118
      119
      120
      121
      122
      123
      124
      125
      126
      127
      128
      129
      130
      131
      132
      133
      134
      135
      136
      137
      138
      139
      140
      141
      142
      143
      144
      145
      146
      147
      148
      149
      150
      151
      152
      153
      154
      155
      156
      157
      158
      159
      160
      161
      162
      163
      164
      165
      166
      167
      168
      169
      170
      171
      172
      173
      174
      175
      176
      177
      178
      179
      180
      181
      182
      183
      184
      185
      186
      187
      188
      189
      190
      191
      192
      193
      194
      195
      196
      197
      198
      199
      200
      201
      202
      203
      204
      205
      206
      207
      208
      209
      210
      211
      212
      213
      214
      215
      216
      217
      218
      219
      220
      221
      222
      223
      224
      225
      226
      227
      228
      229
      230
      231
      232
      233
      234
      235
      236
      237
      238
      239
      240
      241
      242
      243
      244
      245
      246
      247
      248
      249
      250
      251
      252
      253
      254
      255
      256
      257
      258
      259
      260
      261
      262
      263
      264
      265
      266
      267
      268
      269
      270
      271
      272
      273
      274
      275
      276
      277
      278
      279
      280
      281
      282
      283
      284
      285
      286
      287
      288
      289
      290
      291
      292
      293
      294
      295
      296
      297
      298
      299
      300
      301
      302
      303
      304
      305
      306
      307
      308
      309
      310
      311
      312
      313
      314
      315
      316
      317
      318
      319
      320
      321
      322
      323
      324
      325
      326
      327
      328
      329
      330
      331
      332
      333
      334
      335
      336
      337
      338
      339
      340
      341
      342
      343
      344
      345
      346
      347
      348
      349
      350
      351
      352
      353
      354
      355
      356
      357
      358
      359
      360
      361
      362
      363
      364
      365
      366
      367
      368
      369
      370
      371
      372
      373
      374
      375
      376
      377
      378
      379
      380
      381
      382
      383
      384
      385
      386
      387
      388
      389
      390
      391
      392
      393
      394
      395
      396
      397
      398
      399
      400
      401
      402
      403
      404
      405
      406
      407
      408
      409
      410
      411
      412
      413
      414
      415
      416
      417
      418
      419
      420
      421
      422
      423
      424
      425
      426
      427
      428
      429
      430
      431
      432
      433
      434
      435
      436
      437
      438
      439
      440
      441
      442
      443
      444
      445
      446
      447
      448
      449
      450
      451
      452
      453
      454
      455
      456
      457
      458
      459
      460
      461
      462
      463
      464
      465
      466
      467
      468
      469
      470
      471
      472
      473
      474
      475
      476
      477
      478
      479
      480
      481
      482
      483
      484
      485
      486
      487
      488
      489
      490
      491
      492
      493
      494
      495
      496
      497
      498
      499
      500
      501
      502
      503
      504
      505
      506
      507
      508
      509
      510
      511
      512
      513
      514
      515
      516
      517
      518
      519
      520
      521
      522
      523
      524
      525
      526
      527
      528
      529
      530
      531
      532
      533
      534
      535
      536
      537
      538
      539
      540
      541
      542
      543
      544
      545
      546
      547
      548
      549
      550
      551
      552
      553
      554
      555
      556
      557
      558
      559
      560
      561
      562
      563
      564
      565
      566
      567
      568
      569
      570
      571
      572
      573
      574
      575
      576
      577
      578
      579
      580
      581
      582
      583
      584
      585
      586
      587
      588
      589
      590
      591
      592
      593
      594
      595
      596
      597
      598
      599
      600
      601
      602
      603
      604
      605
      606
      607
      608
      609
      610
      611
      612
      613
      614
      615
      616
      617
      618
      619
      620
      621
      622
      623
      624
      625
      626
      627
      628
      629
      630
      631
      632
      633
      634
      635
      636
      637
      638
      639
      640
      641
      642
      643
      644
      645
      646
      647
      648
      649
      650
      651
      652
      653
      654
      655
      656
      657
      658
      659
      660
      661
      662
      663
      664
      665
      666
      667
      668
      669
      670
      671
      672
      673
      674
      675
      676
      677
      678
      679
      680
      681
      682
      683
      684
      685
      686
      687
      688
      689
      690
      691
      692
      693
      694
      695
      696
      697
      698
      699
      700
      701
      702
      703
      704
      705
      706
      707
      708
      709
      710
      711
      712
      713
      714
      715
      716
      717
      718
      719
      720
      721
      722
      723
      724
      725
      726
      727
      728
      729
      730
      731
      732
      733
      734
      735
      736
      737
      738
      739
      740
      741
      742
      743
      744
      745
      746
      747
      748
      749
      750
      751
      752
      753
      754
      755
      756
      757
      758
      759
      760
      761
      762
      763
      764
      765
      766
      767
      768
      769
      770
      771
      772
      773
      774
      775
      776
      777
      778
      779
      780
      781
      782
      783
      784
      785
      786
      787
      788
      789
      790
      791
      792
      793
      794
      795
      796
      797
      798
      799
      800
      801
      802
      803
      804
      805
      806
      807
      808
      809
      810
      811
      812
      813
      814
      815
      816
      817
      818
      819
      820
      821
      822
      823
      824
      825
      826
      827
      828
      829
      830
      831
      832
      833
      834
      835
      836
      837
      838
      839
      840
      841
      842
      843
      844
      845
      846
      847
      848
      849
      850
      851
      852
      853
      854
      855
      856
      857
      858
      859
      860
      861
      862
      863
      864
      865
      866
      867
      868
      869
      870
      871
      872
      873
      874
      875
      876
      877
      878
      879
      880
      881
      882
      883
      884
      885
      886
      887
      888
      889
      890
      891
      892
      893
      894
      895
      896
      897
      898
      899
      900
      901
      902
      903
      904
      905
      906
      907
      908
      909
      910
      911
      912
      913
      914
      915
      916
      917
      918
      919
      920
      921
      922
      923
      924
      925
      926
      927
      928
      929
      930
      931
      932
      933
      934
      935
      936
      937
      938
      939
      940
      941
      942
      943
      944
      945
      946
      947
      948
      949
      950
      951
      952
      953
      954
      955
      956
      957
      958
      959
      960
      961
      962
      963
      964
      965
      966
      967
      968
      969
      970
      971
      972
      973
      974
      975
      976
      977
      978
      979
      980
      981
      982
      983
      984
      985
      986
      987
      988
      989
      990
      991
      992
      993
      994
      995
      996
      997
      998
      999
      1000

```

```

60 CONTINUE
K = 1
IF (KK.EQ.NEWMK) K = NK
KK1 = K
RATIO = 0.
K3 = K
R1 = 1.
R2 = 0.
R3 = 0.
65 CONTINUE
DO 75 L=1,NL
UNWE(KK,L) = U(K,L)*R1 + U(KM1,L)*R2 + U(K3,L)*R3
VWE(KK,L) = V(K,L)*R1 + V(KM1,L)*R2 + V(K3,L)*R3
WWE(KK,L) = W(K,L)*R1 + W(KM1,L)*R2 + W(K3,L)*R3
PWE(KK,L) = P(K,L)*R1 + P(KM1,L)*R2 + P(K3,L)*R3
HWE(KK,L) = H(K,L)*R1 + H(KM1,L)*R2 + H(K3,L)*R3
ZWE(KK,L) = Z(K,L)*R1 + Z(KM1,L)*R2 + Z(K3,L)*R3
75 CONTINUE
100 CONTINUE
C
INTERPOLATE IN PHI.
DO 600 LL=1,NEWM
IF (LL.EQ.1 .OR. LL.EQ.NEWM .OR. NL.EQ.1) GO TO 560
L=L-1
550 L = L + 1
IF (L.GT.NL) GO TO 3000
IF (FINEW(LL).GT.FIL) GO TO 550
LM1 = L-1
L3 = L-2
IF (L.EQ.2 .OR. L.EQ.NL) GO TO 555
IF (FINEW(LL)-FIL) .GT. FI(L+1)-FINEW(LL) L3=L+2
GO TO 557
555 CONTINUE
IF (L.EQ.2) L3=3
557 CONTINUE
R1 = (FINEW(LL)-FIL3)*(FINEW(LL)-FIL)
R1 = ((FIL - FIL3)*FIL) - FIL(LM1)
R2 = (FINEW(LL)-FIL)*(FINEW(LL)-FIL3)
R2 = ((FIL(LM1) - FIL)*FIL) - FIL(L3)
R3 = (FINEW(LL)-FIL(LM1))*(FINEW(LL)-FIL)
R3 = ((FIL(L3) - FIL(LM1))*FIL) - FIL(L)
GO TO 565
560 CONTINUE
L = 1
IF (LL.EQ.NEWM) L = NL

```



```

17610
17620
17630
17640
17650
17660
17670
17680
17690
17700
17710
17720
17730
17740
17750
17760
17770
17780
17790
17800
17810
17820
17830
17840
17850
17860
17870
17880
17890
17900
17910
17920
17930
17940
17950
17960
17970
17980
17990
18000
18010
18020
18030
18040

LMI=L
RATU = 0.
L3 = L
R1 = Y.
R2 = C.
R3 = C.
565 CONTINUE
    DO 575 K=1,NEWNK
        UNWEFF(K,LL) = UNWE(K,L)*R1 + UNWE(K,L)*R2 + UNWE(K,L)*R3
        VNEWEFF(K,LL) = VNEWE(K,L)*R1 + VNEWE(K,L)*R2 + VNEWE(K,L)*R3
        WNEWEFF(K,LL) = WNEWE(K,L)*R1 + WNEWE(K,L)*R2 + WNEWE(K,L)*R3
        PNEWEFF(K,LL) = PNEWE(K,L)*R1 + PNEWE(K,L)*R2 + PNEWE(K,L)*R3
        HNEWEFF(K,LL) = HNEWE(K,L)*R1 + HNEWE(K,L)*R2 + HNEWE(K,L)*R3
        ZINWEFF(K,LL) = ZINWE(K,L)*R1 + ZINWE(K,L)*R2 + ZINWE(K,L)*R3
575 CONTINUE
    IF (IY12.EQ.1) GO TO 600
    DO 580 J=1,NJ
        VNEW(J,LL) = VB(J,L)*R1 + VR(J,L)*R2 + VB(J,L)*R3
        HNEW(J,LL) = HB(J,L)*R1 + HB(J,L)*R2 + HB(J,L)*R3
580 CONTINUE
600 CONTINUE
    IF (IY12.EQ.1) RETURN
    DO 1200 K=1,NFWNK
        ET(K) = ETNEW(K)
1200 CONTINUE
    DO 1300 L=1,NFWNL
        FI(L) = FINEW(L)
    DO 1300 J=1,NJ
        VB(J,L) = VNEWW(J,L)
        HB(J,L) = HNEWW(J,L)
1300 CONTINUE
    RETURN
2000 CONTINUE
    WRITE (6,6010)
6010 FORMAT (* THE NEW Y DISTRIBUTION IS NOT WITHIN THE RANGE OF THE
        &LD DISTRIBUTION*)
    STOP
3000 CONTINUE
    WRITE (6,6020)
6020 FORMAT (* THE NEW PHI DISTRIBUTION IS NOT WITHIN THE RANGE OF THE
        & OLD DISTRIBUTION*)
    WRITE (6,6030) FI,FINEW
6030 FORMAT (6E15.5)
    STOP

```

```

END
SURROUTINE OUTPUT (NK,NL,X,ET,FI,U,V,h,H,P,ZI)
REAL MU,ME
REAL MINF

C THIS SUBROUTINE OUTPUTS THE SOLUTION AT THE ETA-PHI
C GRID OF POINTS FOR A SPECIFIC VALUE OF X.
C THE SOLUTION IS PRINTED, WRITTEN ON TAPE4, AND WRITTEN ON
C TAPE2. TAPE2 CAN BE SET UP AS THE CARD PUNCH SINCE THE
C FORMAT THAT IS USED FOR TAPE2 IS COMPATIBLE WITH THE FORMAT
C THAT SUBROUTINE BCIC USES TO READ THE SOLUTION FROM CARDS.
C HOWEVER FOR RESTART PURPOSES IT IS ADVISABLE TO USE THE
C WRITE ON TAPE4 READ FROM TAPE3 COMBINATION.
C
LEVEL Z,U,V,h,P,h,ZI
DIMENSION ET(NK),FI(NL),U(NK,NL),V(NK,NL),W(NK,NL),
& H(NK,NL),P(NK,NL),ZI(NK,NL)
COMMON /PUNCH/ ITAPE
COMMON /CONST/COSTC,SINTC,REINF,PRINF,ME,RREINF,RPRRE,PREME,GM2,
& MINF,ALFA,SINLF,CTICA,STICA,PINF,PBAR,SPROP
COMMON /VARY/XJML,XJ,XJPL,DX,DXJML,JML,J,JPL
COMMON Y(1)

C*****THE DIMENSIONS OF U,V,W,PZ MUST BE NUMK,NL,NL,6 WHERE NUMK AND**
C*****NUML ARE EQUAL TO OR GREATER THAN NK AND NL BUT EQUAL TO OR**
C*****LESS THAN MAXL (SEE THE MAIN PROGRAM). WHEN THESE**
C*****COC7600 LEARNS HOW TO READ AND WRITE LARGE COORE ARRAYS U,V,W,PZ
C*****CAN BE ELIMINATED AND THE SOLUTION (STORED IN LARGE CORE)*****
C*****CAN BE WRITTEN AND READ DIRECTLY.*****
COMMON /OUTDEP/ U,V,W,PZ(50,20,6)
DATA KTAPE/-1/
WRITE (6,1100) X
DO 200 L=1,NL
QZ1=FI(L)*57.29577951
IF (QZ1.GT.1. .AND. QZ1.LT.119. .AND. L.NE.NL-1) GC TC 200
RZET = 1. / (ZI(L,L)*ET(2)-ET(1))
CALL PROPMC (H(L,L),P(L,L),RHG,DRP,DRH,MU,DZ1,CCN,CZ2)
CFINF = 2.*RREINF*RZET*MU*(U(2,L)-U(1,L))
STINF = RPRRE*CON*RZET*(H(2,L)-H(1,L))
WRITE (6,1200) QZ1,CFINF,STINF,ZI(1,L)
C CONVERT NORMAL COORDINATE TO DIMENSIONED QUANTITY.
QZ1=ZI(1,L)
DO 100 K=1,NK
Y(K)=ET(K)*QZ1
100 CONTINUE
DO 193 K=1,NK
C STATIONS TO BE PRINTED CAN BE CONTROLLED BY AN APPROPRIATE

```

```

C
      STATEMENT HERE.
      IF (K.GT.20 .AND. K.LT.NK .AND. L.NE.NL-1 .AND. J.GT.0) GO TO 193
      HTOT = H(K,L) + .500*WE*(U(K,L)*U(K,L) + V(K,L)*V(K,L) +
      & W(K,L)*W(K,L))
      WRITE (6,1300) Y(K),U(K,L),V(K,L),W(K,L),P(K,L),H(K,L),HTOT
      193 CONTINUE
      200 CONTINUE
      220 CONTINUE
      DO 230 L=1,NL
      DO 230 K=1,NK
      UVWPHZ(K,L,1) = U(K,L)
      UVWPHZ(K,L,2) = V(K,L)
      UVWPHZ(K,L,3) = W(K,L)
      UVWPHZ(K,L,4) = P(K,L)
      UVWPHZ(K,L,5) = H(K,L)
      UVWPHZ(K,L,6) = ZI(K,L)
      230 CONTINUE
      WRITE (4) X,ET,FI,UVWPHZ
      KTAPE=KTAPE+1
      IF (ITAPE.EQ.0) GO TO 500
      KI=KTAPE/ITAPE
      IF (KTAPE.NE.KI*ITAPE.OR.KTAPE.EQ.0) GO TO 500
      WRITE (2,1100) X
      DO 300 L=1,NL
      QZ1=FI(L)*57.29577951
      WRITE (2,2100) QZ1,ZI(L,L)
      QZ1=ZI(L,L)
      DO 250 K=1,NK
      QZ2=ET(K)*QZ1
      WRITE (2,2100) QZ2,U(K,L),V(K,L),W(K,L),P(K,L),H(K,L)
      250 CONTINUE
      300 CONTINUE
      500 CONTINUE
      RETURN
      1100 FORMAT (*1*,10X,*SOLUTION AT X = *,E15.5)
      1200 FORMAT (///,* AT FI = *,F8.2, 5X,*CFINE = *,E13.5, 5X,
      & *STINP = *,E13.5,5X,*SHOCK DISTANCE = *,E13.5,
      & //,8X,*Y*,14X,*U*,14X,*V*,14X,*W*,14X,*P*,14X,*H*,12X,
      & *H TOTAL*,//)
      1300 FORMAT (7E15.5)
      2100 FORMAT (6E12.5)
      END
      SUBROUTINE PROP (H,P,RHO,DRP,DRH,MU,DMH,CON,DCH)
      THIS SUBROUTINE OBTAINS THE FLUID PROPERTIES.
C

```

```

REAL MU,ME
REAL MINF
LEVEL 2,HOP
COMMON /CONST/COSTC,SINTC,REINF,PRINF,MC,RREINF,RPRRE,PAREME,GM2,
      MINF,ALFA,SINALF,CTCA,STSA,STCA,CTSA,PINF,PBAR,SPROP
      C
      DRP=GM2/H
      RHO=DRP*P
      DRH=-RHO/H
      C
      PROPMC IS AN ENTRY POINT USED TO OBTAIN MU AND CCN.
      C
      ENTRY PROPMC
      MU=SQRT(H)*(1.+SPROP)/(1.+SPROP/H)
      DMH=MU*(H+3.*SPROP)/(2.*H*(H+SPROP))
      CON=MU
      DCH=DMH
      RETURN
      C
      PROPRO IS AN ENTRY POINT USED TO OBTAIN RHC
      C
      ENTRY PROPRO
      RHO=GM2*p/H
      RETURN
      END
      C
      SUBROUTINE SOLVEQ (NP,NPM1,NPM16,N,A,B,C,F,DELU,DELV,DELM,
            DELH,DELP,DELZI,DEL,PTSIDE,WCRK1,WORK2,
            WORK3,WORK4)
      C
      C THIS SUBROUTINE USES A CLOCK TRIAGONAL ALGORITHM TO SOLVE
      C THE SYSTEM OF LINEAR EQUATIONS. SEE--ANALYSIS CF NUMERICAL
      C METHODS BY ISAACSON AND KELLER (1966) PP.58,59,60.
      LEVEL 2,A,B,C,F,DELU,DELV,DELM,DELP,DELM,DELZI,
            WORK1,COEFF
      C
      DIMENSION A(N,N,NP1),B(N,N,NP1),C(N,N,NP1),F(N,NP1),
            DELU(NP1),DELV(NP1),DELM(NP1),DELP(NP1),DELZ(INP1)
      DIMENSION DEL(NPM16),RTSIDE(NPM16)
      DIMENSION WORK1(1),WORK2(1),WORK3(1),WORK4(1)
      COMMON /BIGMAT/ COEFF(1)
      DIMENSION BB(6,6),CC(6,6),FF(6)
      M=N*4-1
      LIM=NP+1-NPM1
      C
      FACTOR THE MATRIX
      DO 103 I1=1,6
      DO 103 I2=1,6
      CC(I1,I2)=0.
      103 CONTINUE
      DO 115 IN=2,NP
      DO 108 I1=1,6
      DO 108 I2=1,6

```

```

107 PROD = A(I1,I1,IN)*CC(I1,I2)
DO 107 I3=2,6
PROD = PROD + A(I1,I3,IN)*CC(I3,I2)
107 CONTINUE
108 R(I1,I2,IN) = B(I1,I2,IN) - PROD
108 CONTINUE
DO 109 I1=1,6
DO 109 I2=1,6
B(I1,I2) = D(I1,I2,IN)
CC(I1,I2) = C(I1,I2,IN)
109 CONTINUE
CALL LEC (B,CC,6,6,6,6,DET)
DO 110 I1=1,6
DO 110 I2=1,6
C(I1,I2,IN) = CC(I1,I2)
110 CONTINUE
115 CONTINUE
C
      FORWARD PASS
DO 203 I1=1,6
FF(I1) = 0.
203 CONTINUE
DO 215 IN=2,NP
DO 208 I1=1,6
PROD = A(I1,I1,IN)*FF(I1)
DO 207 I3=2,6
PROD = PROD + A(I1,I3,IN)*FF(I3)
207 CONTINUE
F(I1,IN) = F(I1,IN) - PROD
208 CONTINUE
DO 209 I1=1,6
FF(I1) = F(I1,IN)
DO 209 I2=1,6
B(I1,I2) = B(I1,I2,IN)
209 CONTINUE
CALL LEQ (B,FF,6,6,6,6,DET)
DO 210 I1=1,6
F(I1,IN) = FF(I1)
210 CONTINUE
215 CONTINUE
C
      BACKWARD PASS
DO 303 I1=1,6
DEL((NP-2)*6+I1) = F(I1,NP)
303 CONTINUE
DO 315 IN=1,NP

```

19370
19380
19390
19400
19410
19420
19430
19440
19450
19460
19470
19480
19490
19500
19510
19520
19530
19540
19550
19560
19570
19580
19590
19600
19610
19620
19630
19640
19650
19660
19670
19680
19690
19700
19710
19720
19730
19740
19750
19760
19770
19780
19790
19800

```

      NI = NP+2-IN
      DO 300 I1=1,6
      PROD = C(I1,1,NI)*DEL((NI-1)*6+1)
      DO 307 I3=2,6
      PROD = PROD + C(I1,I3,NI)*DEL((NI-1)*6+I3)
307 CONTINUE
      DEL1(NI-2)*6+I1) = F(I1,NI) - PROD
308 CONTINUE
315 CONTINUE

      DO 400 I1=LIM,NP
      I2=(I1-LIM)*N+N-6
      DELU(I1)=DEL(I2+2)
      DELV(I1)=DEL(I2+3)
      DELW(I1)=DEL(I2+4)
      DELP(I1)=DEL(I2+5)
      DELH(I1)=DEL(I2+6)
400 CONTINUE
      IF (N.EQ.5) RETURN
      DO 500 I1=LIM,NP
      I2=(I1-LIM)*6
      DELZ(I1)=DEL(I2+1)
500 CONTINUE
      RETURN
      END

```